



TITLE:

THE SYLLIDAE (POLYCHAETOUS ANNELIDS) FROM JAPAN (II) - AUTOLYTINAE-

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THE SYLLIDAE (POLYCHAETOUS ANNELIDS) FROM JAPAN (II)*
AUTOLYTINAE

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With 1 Diagram and 21 Text-figures

Subfamily: AUTOLYTINAE RIOJA, 1925

Key to the genera of AUTOLYTINAE from Japan

1. Dorsal cirri slender and cirriform throughout *Autolytus*
1. Dorsal cirri not cirriform 2
2. Dorsal cirri flat blade-shaped; with a pair of nuchal epaulettes *Myrianida*
2. Dorsal cirri clavate or foliaceous; with a pair of nuchal lobes *Autosyllis*

Autolytus GRUBE, 1850

Type: *Autolytus prolifer* (O. F. MÜLLER, 1788)

= *Polybostrichus* OERSTED, 1843; type: *Polybostrichus longosetosus* OERSTED, 1843.

= *Sacconereis* M. MÜLLER, 1855; type: *Sacconereis helgolandica* M. MÜLLER, 1855.

= *Proceraea* EHLERS, 1864; type: *Proceraea picta* EHLERS, 1864.

= *Stephanosyllis* CLAPARÈDE, 1864; type: *Autolytus (Stephanosyllis) scapularis* CLAPARÈDE, 1864.

The body of the atokous stage is slender and attenuated posteriorly. The dorsum is arched and with or without color markings; each segment is provided with one or two ciliary or papillary bands, or they are lacking. The prostomium is suboval or subrectangular; it has two pairs of eyes in trapezoidal arrangement. Palpi are small and directed ventrally; they are usually fused medially. Three antennae, two pairs of tentacular cirri and the first dorsal cirri are filiform and very much longer than those of the succeeding segments.

Dorsal cirri alternate long and short or are subequal in length; they are smooth or sometimes annulate. Two nuchal epaulettes extend from the hind margin of the prostomium to the first few segments; they are sinuous or subtriangular. The pharynx is S-shaped or straight, and distally surrounded by some soft papillae. The trepan has a circlet of various kinds of teeth.

* Continued from Part I (XIII (5), pp. 385-404).

The proventriculus is ovoid or ellipsoid; it is orange in life. Parapodia are bluntly rounded; each has a setal fascicle; ventral cirri are lacking. Each species has three kinds of individuals: atokous stocks which asexually bud off male or female stolons, singly or in chains. Sexual generation shows dissimilar males (*Polybostrichus*) and females (*Sacsonereis*).

Male stolons or *Polybostrichus* stage: The body is divided usually into three regions; a pre-epitokal region with unmodified setigers, an epitokal region with long hairlike swimming setae emerging between the dorsal cirri and parapodia, and a post-epitokal region of unmodified setigers without swimming setae. The prostomium is subrectangular with round anterior margin; it has two pairs of eyes, of which the ventral pair is lensed and much larger than the dorsal one. The paired lateral antennae are distally bifurcated and arise from anterior margin of the prostomium; present also is a median and two short frontal antennae. Tentacular cirri number two or three pairs; one pair of tentacular cirri or first dorsal cirri are very long and similar to the median antenna.

Female stolons or *Sacsonereis* stage: The body is divided into two or three regions similar to the *Polybostrichus* stage. The prostomium has two pairs of large eyes and three subequal antennae. Tentacular cirri number two or three pairs. The dorsal cirri are rather long and subequal. The body has a large sack containing many early embryos or larvae attached to the abdomen, or many eggs are crowded in the body cavity.

The species of *Autolytus* have hitherto been distinguished mainly by the external characteristics, such as shape of body, setae, dorsal cirri, mode of reproduction, etc. In specimens of *Autolytus* from Japan, some couples of

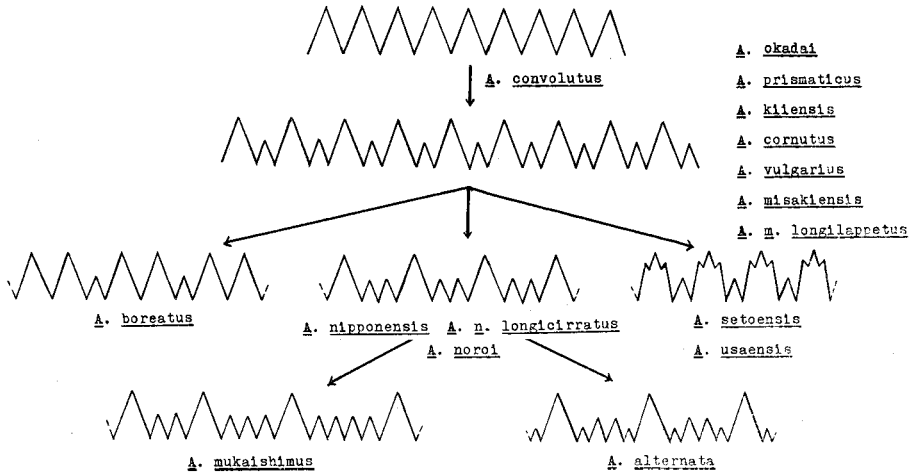
Table 1. Some couples of allied species of *Autolytus*.

| Characters Couples of allied species | Color pattern of body | Dorsal cirrus | Nuchal epaulette | Setae | Trepan |
|--|-----------------------------|------------------|---------------------|--------------------------------|---|
| <i>A. okadai</i> | with two longitudinal bands | all are subequal | one segment | bidentate composite | 9 large + 9 small teeth |
| <i>A. boreatus</i> | same | same | same | same | 18 large + 9 small teeth |
| <i>A. vulgarius</i> | absent | all are subequal | two segments | uni- and bi-dentate composites | 9 large + 9 small teeth |
| <i>A. setoensis</i> | same | same | same | same | 9 large with lateral teeth + 9 small t. |
| <i>A. convolutus</i> | absent | all are subequal | three segments | bidentate composite | 9 large teeth |
| <i>A. misakiensis longilappetus</i> | same | same | same | same | 9 large + 9 small teeth |

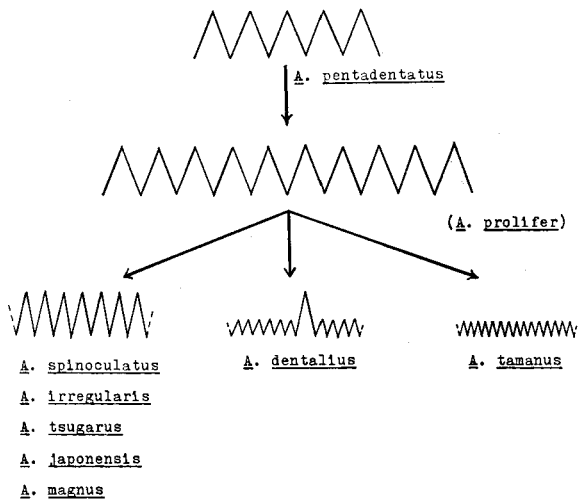
Diagram 1.

Chart showing possible affinities of pharyngeal teeth
in the genus Autolytus from Japan

A. VARIANT TYPES OF TREPAN IN
AUTOLYTUS (REGULATUS)



B. VARIANT TYPES OF TREPAN IN
AUTOLYTUS (AUTOLYTUS)



characters are noted: the external characters of two species correspond with each other, but each has a different trepan, thus superficially cryptic species but morphologically separable.

Some examples are shown in the Table 1:

It is therefore difficult to determine the specific name by the external characters, without examination of the trepan. It is therefore emphasized that the identity of *Autolytus* be made only after an examination of the pharyngeal teeth or trepan.

The trepan of species of *Autolytus* from Japan may be one of two kinds: (1) trepan with 9 teeth or a multiple of 9 regularly arranged in large and small teeth are referred to subgenus *Regulatus* and (2) trepan with a circular or irregular number of subequal teeth, to subgenus *Autolytus*.

The following species from Japan are referable to subgenus *Regulatus*: *A. convolutus*, *A. boreatus* n. sp., *A. mukaishimus* n. sp., *A. alternata*, *A. okadai* n. sp., *A. prismaticus*, *A. kiiensis* n. sp., *A. cornutus*, *A. vulgarius* n. sp., *A. misakiensis* n. sp., *A. misakiensis longilappetus* n. subsp., *A. noroi*, *A. nipponensis*, *A. nipponensis longicirratu* n. subsp., *A. setoensis* n. sp. and *A. usaensis* n. sp.

The following species from Japan go to subgenus *Autolytus*: *A. magnus*, *A. pentadentatus* n. sp., *A. dentalius* n. sp., *A. tamanus* n. sp., *A. tsugarus* n. sp., *A. japonensis*, *A. spinoculatus* n. sp. and *A. irregularis*.

The Diagram 1 shows diagrammatically the trepans in the species of both subgenera; the relations in each kind of trepan show possible affinities.

A. (Regulatus) convolutus has a trepan consisting of 9 large teeth only. Moreover, the pharynx is long and irregularly coiled, not S-shaped as in most of the species. Both characteristics may be primitive among the species of *Regulatus*.

Seven species of *A. pacificus*, *A. prismaticus*, *A. kiiensis*, *A. cornutus*, *A. vulgarius*, *A. misakiensis* and *A. misakiensis longilappetus* have a trepan consisting of 9 large teeth alternating with 9 small teeth. This formula may be derived from the first one. Five other kinds consisting of a variable number of large and small teeth are more elaborated (see Diagram 1, A).

In the subgenus *Autolytus*, *A. pentadentatus* has a trepan consisting of 5 large teeth only, and *A. prolifer* has 10 large teeth. A variable number occurs in other species: 2 large and 29 small teeth in *A. dentalius*; 90 rudimentary tooth in *A. tamanus*; and different numbers of subequal teeth in *A. spinoculatus*, *A. irregularis*, *A. tsugarus*, *A. japonensis* and *A. magnus* (see Diagram 1, B).

Key to species of *Autolytus* from Japan

1. Pharyngeal trepan consisting of 9 teeth or multiple of 9, alternating large and small ...
..... Subgenus *Regulatus* ... 2

1. Pharyngeal trepan consisting of an irregular number of subequal teeth Subgenus *Autolytus* ... 12
2. Trepan with 9 equal teeth *A. (Regulatus) convolutus*
2. Trepan with many more teeth 3
3. Trepan with 18 large and 9 small teeth, alternating one median small and two large teeth *A. (R.) boreatus*
3. Trepan with 9 large teeth each separated by 2 to 4 small teeth *A. (R.) mukaishimus*
3. Trepan with 9 large, alternating with 36 small teeth of which 18 larger alternate with 18 smaller ones *A. (R.) alternata*
3. Trepan with 9 large teeth alternating with 9 small teeth 4
3. Trepan with 9 large and 18 small teeth, alternating one median large and two small teeth 9
3. Trepan with 9 large teeth accompanied by two lateral teeth 11
4. Dorsum with longitudinal black bands 5
4. Dorsum without longitudinal black band 6
5. Dorsum with 2 longitudinal black bands *A. (R.) okadai*
5. Dorsum with 3 longitudinal black bands *A. (R.) prismaticus*
5. Dorsum with 4 longitudinal black bands *A. (R.) kiiensis*
6. Second dorsal cirri subequal to succeeding cirri *A. (R.) cornutus*
6. Second dorsal cirri 2 to 3 times as long as succeeding cirri 7
7. Anterior parapodia with unidentate and bidentate compound setae *A. (R.) vulgaris*
7. Anterior parapodia with bidentate compound setae only 8
8. With nuchal epaulettes extending through one segment only *A. (R.) misakiensis*
8. With nuchal epaulettes extending through three segments...*A. (R.) misakiensis longilappetus*
9. With pigmented ducts beneath the epithelium; nuchal epaulettes extending through three segments *A. (R.) noroi*
9. Without such ducts; nuchal epaulettes extending through two segments 10
10. With median antenna extending back to the 15th, and lateral ones to the 10th segment *A. (R.) nipponensis*
10. With median antenna extending back to the 7th and lateral ones to the 6th segment *A. (R.) nipponensis longicirratus*
11. With nuchal epaulettes extending through two segments *A. (R.) setoensis*
11. With nuchal epaulettes extending through six segments *A. (R.) usaensis*
12. Sexual stolons with 3 pre-epitokal segments *Autolytus* sp., *Polybostrichus* stage
12. Sexual stolons with 14 pre-epitokal segments *A. (Autolytus) magnus*, *Polybostrichus* and *Sacconereis* stages
12. Sexual stolons not known 13
13. Trepan with 5 equal teeth *A. (A.) pentadentatus*
13. Trepan with many more teeth 14
14. With trepan consisting of subequal teeth 15
14. With trepan consisting of 2 large and 19 small teeth *A. (A.) dentalius*
15. Trepan with 90 rudimentary teeth *A. (A.) tamanus*
15. Trepan with 20 to 50 teeth 16
16. Anterior parapodia with unidentate simple setae and bidentate compound setae 17
16. Anterior parapodia with bidentate compound setae only 18
17. Dorsum with transverse brown bands; dorsal cirri extend to tip of setigerous lobe; trepan with 40 teeth *A. (A.) tsugarus*
17. Dorsum without color band; dorsal cirri not extending to tip of setigerous lobe; trepan with 45 teeth *A. (A.) japonensis*
18. Trepan with 20 to 21 teeth; nuchal epaulettes extending through 3 segments *A. (A.) spinoculatus*

18. Trepan with 27 to 28 teeth; nuchal epaulettes extending through 5 segments
 *A. (A.) irregularis*
 18. Trepan with 47 to 48 teeth; nuchal epaulettes extending through 4 segments
 *A. (A.) magnus*, atokous form

Autolytus (Autolytus) pentadentatus n. sp.

(Text-fig. 6, a-h)

Collection: Seto, in intertidal zone among seaweed.

Description: The largest of five individuals measures 6 mm long and 0.5 mm wide including parapodia; it consists of 65 setigerous segments. The body is yellowish brown and has no color markings (preserved). The prostomium (fig. a) is broader than long, with round anterior margin, and two pairs of eyes in trapezoidal arrangement. A median antenna arises from the center of the prostomium and extends back to the 10th segment. Lateral antennae arise from the anterior margin of the prostomium and are about half as long as the median antenna. A pair of broad nuchal epaulettes extends from the posterior margin of the prostomium to the median part of the third segment. The pharynx is S-shaped, and distally surrounded by five soft papillae. The trepan (fig. b) has a circlet of five large teeth; all are subequal in size. The proventriculus is located in setigerous segments 12 to 14. Palpi are small and fused throughout. Dorsal tentacular cirri are about as long as the lateral antennae, and ventral cirri are about half as long as the dorsal ones. The first dorsal cirri are slightly shorter than the median antenna. The second cirri are about half as long as the first ones. The following dorsal cirri alternate long and short (figs. c, d); each has a long cirrophore and a long cirrus with an annulus at its mid-length. Parapodia are bluntly rounded with a pointed acicular lobe. Setae number 3 to 7 in a fascicle; each has a large secondary tooth and smooth cutting margin (fig. e); those in anterior parapodia have a cutting margin minutely serrated (fig. f). Acicula (fig. g) are singly in parapodia and distally pointed. A bayonet seta (fig. h) is first present from the 35th parapodium.

The species is characterized as follows: (1) nuchal epaulettes extend through three segments; (2) the pharynx has 5 papillae and 5 teeth, and (3) the long dorsal cirri consist of two annulations.

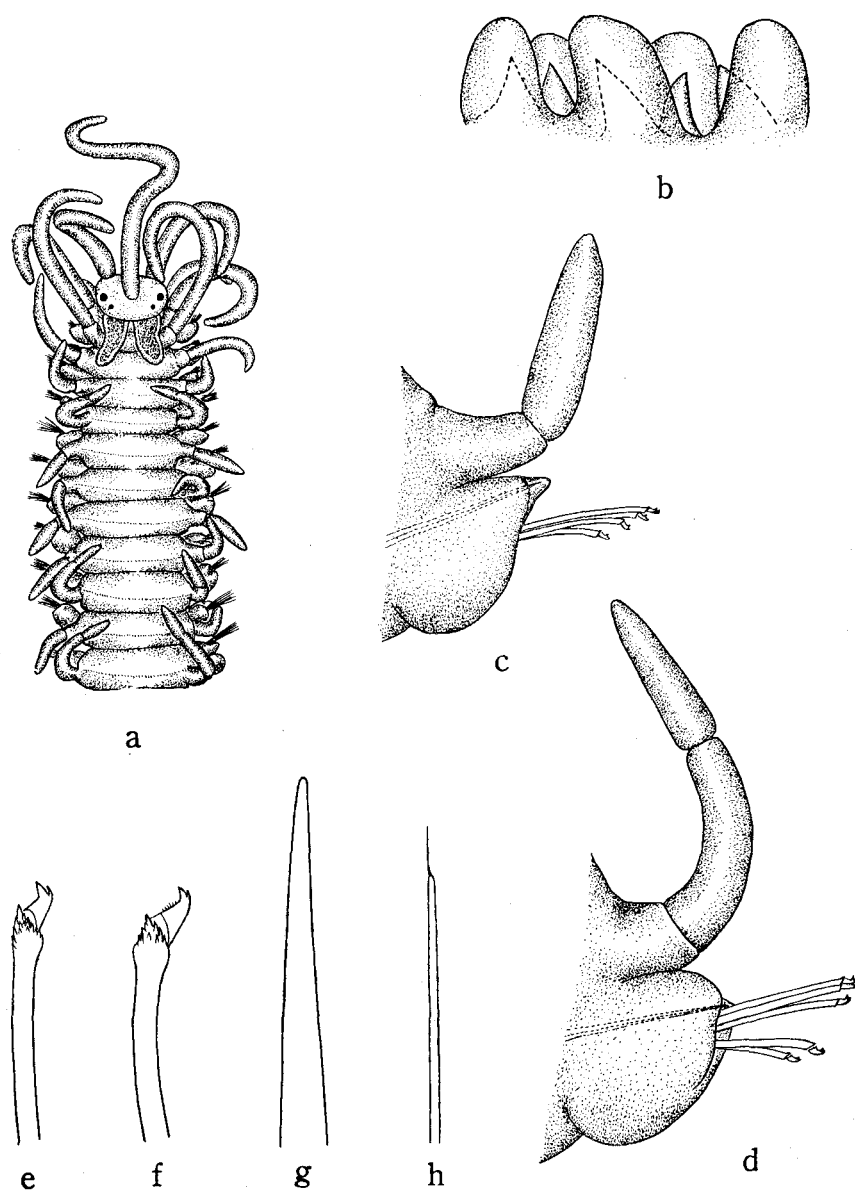
Distribution: Southern Japan.

Autolytus (Autolytus) spinoculatus n. sp.

(Text-fig. 7, a-h)

Collection: Seto, from intertidal zone.

Description: The largest of three individuals measures 4 mm long and



Text-fig. 6. *Autolytus (Autolytus) pentadentatus* n. sp. a, anterior end, in dorsal view, $\times 55$; b, a part of pharyngeal trepan, $\times 480$; c, 22nd parapodium, in anterior view, $\times 190$; d, 23rd parapodium, in same view, $\times 190$; e, compound seta from 22nd parapodium, $\times 950$; f, compound seta from 1st parapodium, 950; g, aciculum, $\times 950$; h, bayonet seta, $\times 950$.

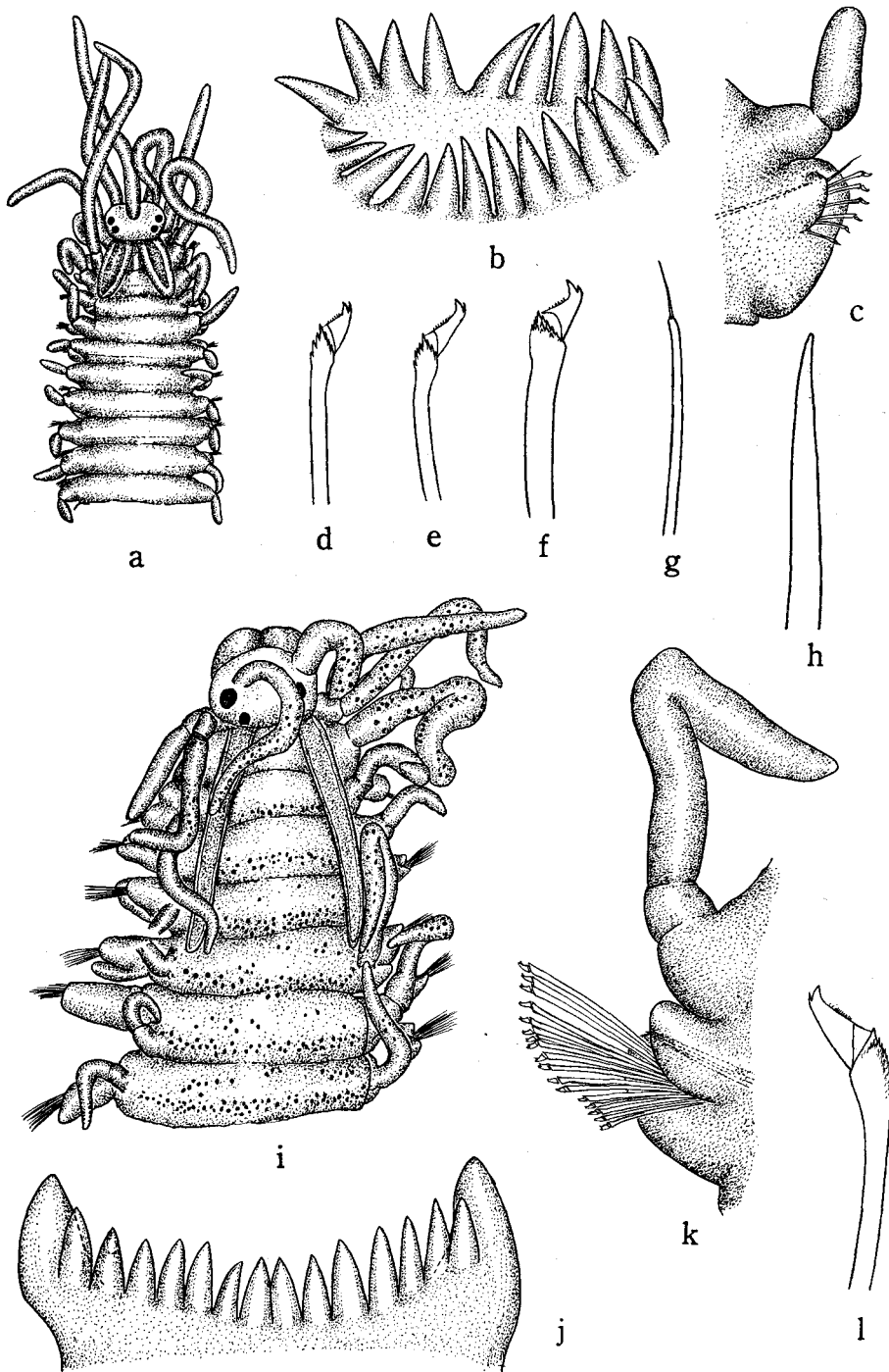
0.5 mm wide for 50 setigerous segments. The body is orange and has no color markings. The prostomium is broader than long; there are two pairs of eyes in trapezoidal arrangement (fig. a). A median antenna arises between the anterior eyes and extends back to the ninth segment. Lateral antennae arise from the anterior margin of the prostomium and are slightly shorter than the median one. Nuchal epaulettes extend from the posterior margin of the prostomium through the third segment. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan (fig. b) is provided with a series of 20 to 21 equal teeth; each tooth is slender and conical. The proventriculus extends from the ninth to the twelfth segment. A ciliary band extends dorsally across each segment, between the bases of the dorsal cirri. The dorsal tentacular cirri of the first segment are about as long as the lateral antennae, and the ventral ones are slightly shorter than half the length of the dorsal one. The first dorsal cirri are longer than the median antenna. The second dorsal cirri are about one-third as long as the first cirri, and more posterior cirri are equal in length; they are about one-fourth as long as the body is wide. The parapodium (fig. c) is bluntly conical; all setae are compound. Setae of the first parapodium are slenderer than those farther back; the appendage of the superior seta (fig. d) is shorter than the inferior one (fig. e) and has a large terminal tooth; the cutting margin is minutely serrated. A typical seta (fig. f) has a large secondary tooth. A bayonet seta (fig. g) is first present from the thirteenth parapodium. Acicula (fig. h) occur singly in parapodia; each tapers distally to a pointed tip.

Autolytus spinoculatus resembles *A. edwardi* SAINT-JOSEPH from France, *A. macrophthalmus* MARENZELLER from Adria and *A. benazzii* COGNETTI from the Gulf of Naples; all have a circlet of 20 to 24 equal pharyngeal teeth. These species differ from *A. spinoculatus* as follows: *A. edwardi* has two nuchal epaulettes on the first, instead of through three segments; the nuchal epaulettes of *A. macrophthalmus* and *A. benazzii* are unknown; *A. benazzii* has dorsal cirri alternating long and short.

Distribution: Southern Japan.

Text-fig. 7. *Autolytus (Autolytus) spinoculatus* n. sp. a, anterior end, in dorsal view, $\times 55$; b, pharyngeal trepan, $\times 950$; c, 16th parapodium, in anterior view, $\times 190$; d, superior compound seta from 1st parapodium, $\times 950$; e, inferior compound seta from same parapodium, $\times 950$; f, compound seta from 16th parapodium, $\times 950$; g, bayonet seta, $\times 950$; h, aciculum, $\times 950$.

Autolytus (Autolytus) dentalius n. sp. i, anterior end, in dorsal view, $\times 75$; j, one side of pharyngeal trepan, $\times 950$; k, 6th parapodium, in anterior view, $\times 190$; l, compound seta, $\times 950$.



Autolytus (Autolytus) irregularis IMAJIMA and
HARTMAN, 1964

Autolytus irregularis IMAJIMA and HARTMAN, 1964, pp. 90-92, pl. 16, fig. h, pl. 17, figs. a-f.

Occurrence: Off Cape Shiriyazaki, in 140 to 350 m.

Diagnosis: The largest individual measures 10 mm long and 0.8 mm wide for 92 setigerous segments. The body is creamy white without pigmented pattern (preserved). The prostomium is subglobular; there are two pairs of reddish eyes. A median antenna extends back to the 14th segment. Lateral antennae are about half as long as the median one. The two nuchal epaulettes extend through five segments. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan has a circlet of 27 to 28 teeth arranged irregularly small and large; they are not conspicuously different in size. The proventriculus extends from segments 10 (or 12) to 12 (or 14). The dorsum of each segment has single transverse band of many minute papillae. The first dorsal cirri are about as long as the median antenna. The second are about one-third as long as the first. More posterior dorsal cirri alternate slightly long and short; they are about half as long as the body is wide. Parapodia are bluntly conical and have fascicles of bidentate compound setae; each seta has a large subdistal, secondary tooth larger than the terminal one; the cutting margin is smooth. A bayonet seta is first present from about parapodium 30; each is about one-third as wide as the compound setae. Acicula are usually single in parapodia; each one tapers to a pointed tip. The pygidium has two long anal cirri.

Autolytus irregularis is referred to the subgenus *Autolytus*, for having a trepan with 27 or 28 subequal teeth.

A. irregularis resembles *A. alternata*, *A. usaensis*, *A. magnus* and *A. alexandri* in having a pair of long nuchal epaulettes through several segments. However, the first is distinguished from the others in the formula of its trepan; *A. alexandri* is known only through its *Polybostrichus* stage, which lacks a pharyngeal armature.

Distribution: Northern Japan.

Autolytus (Autolytus) dentalius n. sp.

(Text-fig. 7, i-l)

Autolytus alexandri HARTMAN, 1945, p. 17, pl. 2, fig. 11 (not MALMGREN, 1867).

Collection: Off Senda-zaki, in Uruga Strait, in 10 m.

Description: A single damaged individual was examined; it lacked a median antenna, most of the dorsal cirri and the posterior end of the body. The fragment measures 5 mm long and 0.5 mm wide including parapodia for

47 setigerous segments; it is whitish yellow and studded with small brown dots on the antennae, dorsal cirri and dorsum. The prostomium (fig. i) is broader than long with rounded anterior margin. Two pairs of eyes are in trapezoidal arrangement, the anterior pair much the larger. Palpi are fused throughout their length. Lateral antennae arise in front of the anterior eyes and about four times as long as the prostomium. Two nuchal epaulettes extend from the posterior margin of the prostomium to the sixth segment. Dorsal tentacular cirri are slightly shorter than the lateral antennae and ventral cirri are about half as long as the dorsal ones. The first left dorsal cirrus was lost and the right one is distally damaged. The following dorsal cirri are about half as long as the body is wide. The distal papillae of the pharynx cannot be observed. The trepan is reddish brown and has two large lateral teeth and 14 small teeth in the dorsal, and 15 in the ventral arc (fig. j). The proventriculus occurs in setigerous segments 10 to 13. Parapodia (fig. k) are bluntly conical and have a fascicle of bidentate compound setae (fig. l). Acicula number 2 to 4 in each parapodium. A bayonet seta is not present in the parapodia of the fragment.

Autolytus dentalius is characterized as follows: (1) nuchal epaulettes are present on the first six segments; (2) a trepan has two large and 29 small teeth, and (3) antennae, dorsal cirri and dorsum have many brown dots.

Autolytus alexandri HARTMAN (1945) from North Carolina is newly referred to the present species. This was examined and found to have; (1) a trepan with two large and 30 small teeth, the large teeth are slightly smaller than twice as large as the small ones and all small ones are about equal in size and (2) a pair of nuchal epaulettes extends through five, instead of six segments.

Distribution: Central Japan; North Carolina.

Autolytus (Autolytus) japonensis IMAJIMA and HARTMAN, 1964

Autolytus japonensis IMAJIMA and HARTMAN, 1964, pp. 92-93, pl. 17, figs. g-o.

Occurrence: Off Cape Shiriyazaki, in 140-360 m.

Diagnosis: The largest specimen measures 12 mm long and 0.4 mm wide for 66 setigerous segments. The body is pale yellow without color markings (preserved). The prostomium is broader than long; there are two pairs of reddish eyes. A median antenna extends back to the seventh segment. Lateral antennae are about half as long as the median one. Nuchal epaulettes are present on the first segment as subtriangular lobes. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan has a circlet of 45 teeth of uniform size. The proventriculus is short, subglobular and occurs in the eighth segment. The first dorsal cirri are very slender and reach to the fifth setigerous segment. The second is short, its length equal

half the width of the segment. The remaining dorsal cirri are very short and conical; they do not extend beyond the tips of their parapodia. Each of first four parapodia has a thick, simple hooked seta with indistinct serrations about the inflated portion, together with transitional bidentate pseudocompound setae. From the fifth parapodium the thick, simple hooked setae are replaced by transitional bidentate, pseudocompound setae with serrations on the end of the shaft. On the seventh parapodium they are replaced by bidentate, pseudocompound setae. Parapodia are supported by 2 or 3 acicula. A bayonet seta is first present from the third parapodium.

Distribution: Northern Japan.

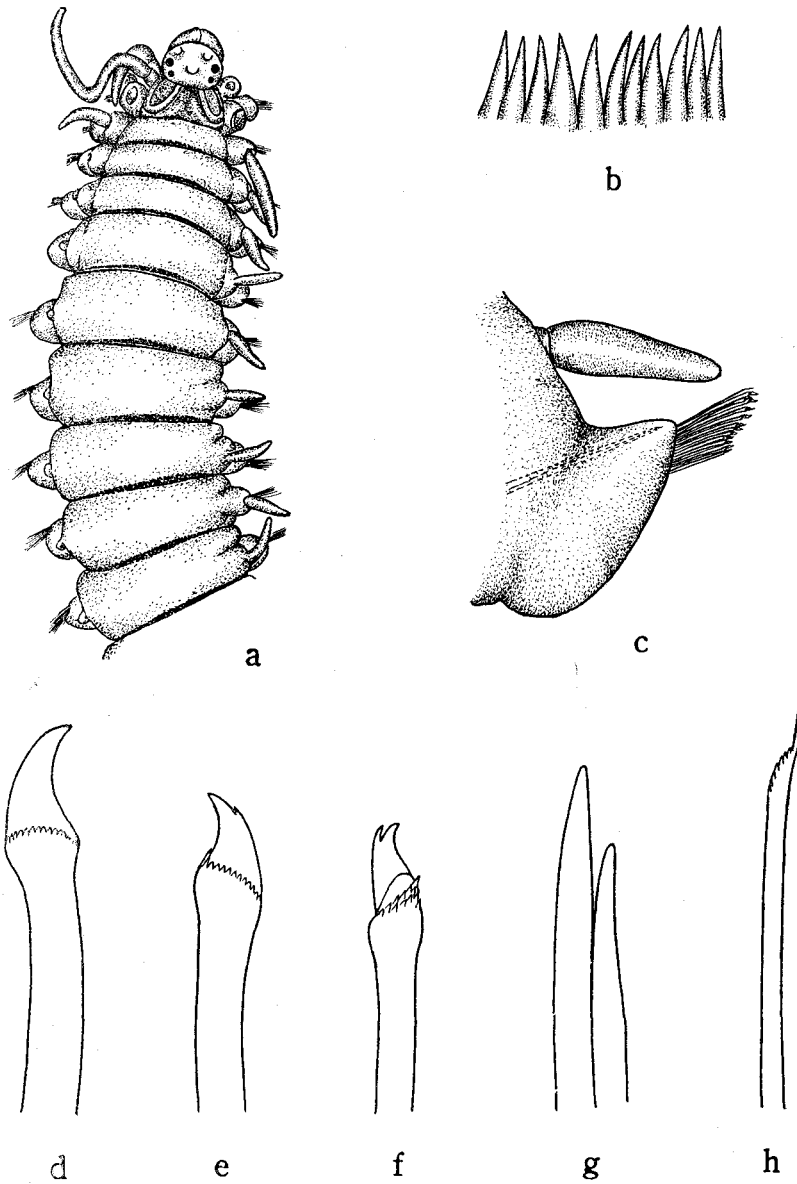
Autolytus (Autolytus) tsugarus n. sp.

(Text-fig. 8, a-h)

Collection: Off Shirikishinai, in 140 m.

Description: A single individual measures 16 mm long and about 1 mm wide including the parapodia; it consists of 88 setigerous segments. The body is yellowish white; a narrow, brown transverse band extends along the posterior margin of each segment (fig. a). The prostomium is subglobular. Two pairs of eyes are located in trapezoidal arrangement; the anterior pair is larger than the posterior one. All antennae were lost before examination was made. Palpi are fused medially. Nuchal epaulettes extend from the posterior margin of the prostomium to the second segment. The pharynx is S-shaped; it terminates distally in a circlet of 9 soft papillae. The pharyngeal teeth of the trepan (fig. b) are slender and number 40. The proventriculus is ellipsoid and extends from the eighth to the tenth segment. The tentacular segment is dorsally fused with the first setigerous segment. The first dorsal cirri have been lost. The second dorsal cirri are as long as the width of the second setigerous segment. The following dorsal cirri are digitate and about one-third as long as the body is wide (fig. c); they are all subequal. Each of first three parapodia has 10 to 12 thick, simple hooked setae with indistinct serrations around the inflated portion (fig. d). The fourth parapodium has 12 transitional bidentate pseudocompound setae (fig. e) and simple hooked setae similar to those of the first parapodium in the inferior part of the fascicle. In more posterior parapodia they are replaced by bidentate compound setae (fig. f). Acicula number 2 or 3 in a parapodium; each is distally tapered to a pointed tip (fig. g). A bayonet seta (fig. h) is first present from the eighteenth parapodium.

Autolytus (Autolytus) tsugarus resembles *A. fasciatus* (Bosc, 1802) from Massachusetts in the following respects: the dorsum has a brown transverse band across each segment and the nuchal epaulettes extend through two



Text-fig. 8. *Autolytus* (*Autolytus*) *tsugarus* n. sp. a, anterior end, in dorsal view, $\times 30$; b, a part of pharyngeal trepan, $\times 370$; c, 20th parapodium, $\times 95$; d, simple hooked seta from 1st parapodium, $\times 950$; e, transitional bidentate, pseudocompound seta from 4th parapodium, $\times 950$; f, bidentate compound seta from 8th parapodium, $\times 950$; g, acicula, $\times 800$; h, bayonet seta, $\times 950$.

segments. Through the courtesy of Dr. PETTIBONE two specimens of *A. fasciatus* (1963, p. 141) from Massachusetts were examined and found to have a trepan with 18 teeth, alternating 9 large and 9 small teeth and all parapodia have bidentate compound setae.

The species also resembles *A. japonensis* IMAJIMA and HARTMAN (1964) from off Cape Shiriyazaki, in 140 m, in having unidentate simple setae in the anterior parapodia and a circlet of pharyngeal teeth of equal size, numbering 40 to 45. However, the two species are distinguished from each other as follows: (1) the first has instead of lacks a brown transverse band along the posterior margin of each segment; (2) the dorsal cirri of the first are digitate and extend beyond the tips of parapodia, instead of conical and do not extend beyond them, and (3) the nuchal epaulettes of the first extend through two, instead of only one segment.

Distribution: Northern Japan.

Autolytus (Autolytus) magnus BERKELEY, 1923

(Text-fig. 9, a-f; Text-fig. 10, a-f; Text-fig. 11, a-d)

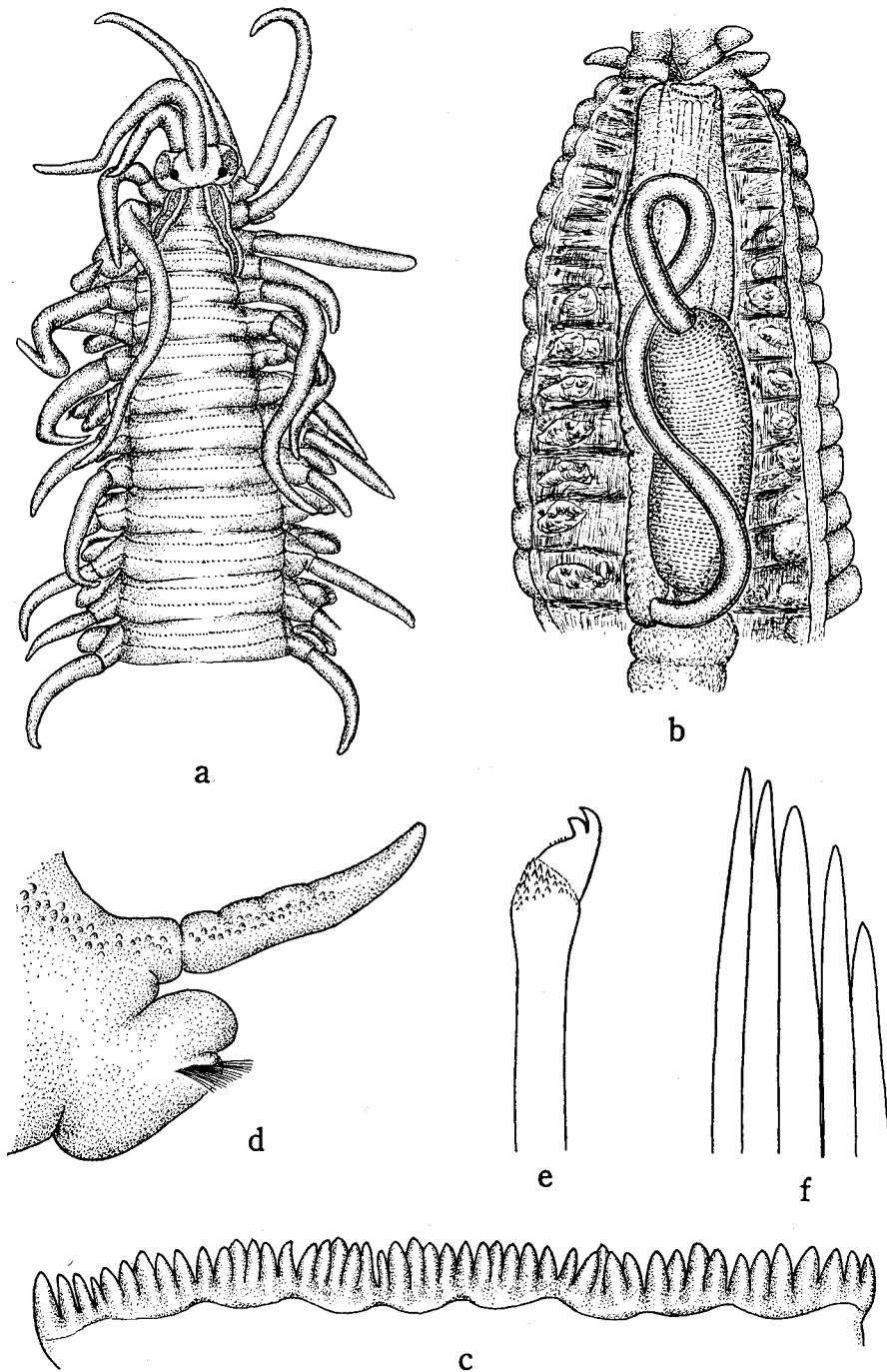
Autolytus magnus BERKELEY, 1923, p. 210, pl. 1, figs. 3, 4; BERKELEY and BERKELEY, 1938, p. 47; 1945, p. 318; 1948, p. 70, fig. 101; HARTMAN, 1948, p. 24; IMAJIMA and HARTMAN, 1964, pp. 93-95, pl. 18, figs. a-c.

Atokous form

(Text-fig. 9, a-f)

Collection: Shirikishinai, in intertidal depths among seaweed colony.

Description: A single individual, posteriorly incomplete, measures 11 mm long and 1.8 mm wide including parapodia; it consists of 41 setigerous segments. The body is pale yellow and there are no color markings. The prostomium (fig. a) is subrectangular and about twice as broad as long. Two pairs of eyes are reddish; the ventrolateral pair is much larger than the dorsal pair. Palpi are fused medially and directed ventrally. The three antennae are thick and wrinkled but not articulated; the median one arises from the center of the prostomium and extends back to the ninth segment; the lateral ones arise from the anterior margin of the prostomium and are about three-fourths as long as the median one. Nuchal epaulettes are sinuous lappets and extend from the hinder margin of the prostomium to the fourth segment. The pharynx is S-shaped; it terminates distally in a circlet of 9 soft papillae (fig. b). The trepan (fig. c) has 47 or 48 teeth arranged irregularly small and large. The proventriculus is ellipsoid and extends from



Text-fig. 9. *Autolytus* (*Autolytus*) *magnus* BERKELEY, *Atokous* form. a, anterior end, in dorsal view, $\times 20$; b, pharynx and proventriculus shown by dissection, in ventral view, $\times 20$; c, pharyngeal trepan opened by dissection, $\times 190$; d, 20th parapodium, $\times 55$; e, compound seta, $\times 950$; f, acicula from 20th parapodium, $\times 800$.

the twelfth to the sixteenth segment. Dorsal tentacular cirri on the first segment are about as long as the median antenna and ventral cirri are about half as long as the dorsal ones. The first dorsal cirri extend back to the twelfth segment. Through the first seven segments the dorsal cirri alternate long and short, and thereafter they are subequal. The dorsum of each segment is crossed by two bands of many small papillae; the posterior band extends to the dorsal cirri. A normal parapodium (fig. d) is thick, bluntly conical and has a fascicle of compound setae; these number about 30 in a fascicle. Each seta (fig. e) has a strong, beak-shaped secondary tooth; the cutting margin has minute serrations and the shaft is distally spinous. Acicula (fig. f) are yellow and distally tapered to acute points; they number 5 in the 20th parapodium. The pygidium is unknown.

An atokous specimen of *A. magnus* (HARTMAN, 1948, p. 24) from Alaska was examined and found to have a trepan with 45 teeth of equal size.

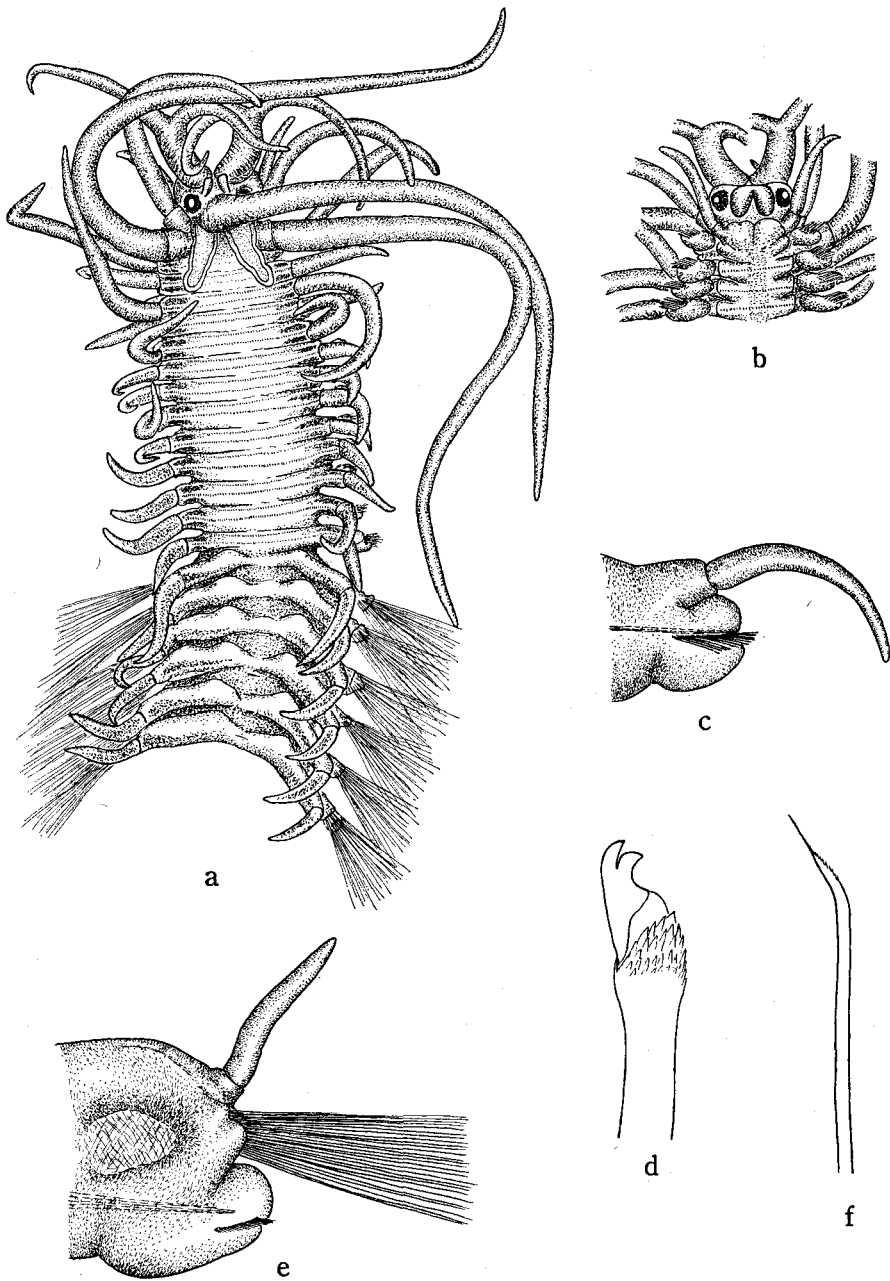
The *Atokous* form of the species is new to Japan.

Polybostrichus stage

(Text-fig. 10, a-f)

Collection: Off Shirikishinai, in plankton tows in April and May.

Description: Individuals measure 10 to 25 mm long and 1.8 to 3 mm wide including parapodia. Three body regions (fig. a) may be distinguished: (1) an anterior region with the prostomium, one achaetous segment and 14 pre-epitokal segments; (2) a median region with 31 to 41 epitokal segments, and (3) a caudal region with 17 to 41 postepitokal segments and pygidium. The body is brown in life and pale yellow, preserved; there are no color bands on the dorsum. The prostomium is broader than long and its anterior margin is straight. There are two pairs of reddish eyes, each with a white lens; the ventral pair is the larger. A median antenna arises from the posterior part of the prostomium and extends back to the 25th setigerous segment. The paired antennae arising from the anterior border of the prostomium are very large, thick and flat at their bases; they bifurcate at their basal third and terminate in two cylindrical branches which are subequal and have long, tapering distal ends. Two short frontal lobes are inserted in front of the dorsal eyes. A pair of palpi forms blunt lobes on the ventral side of the prostomium; they are fused at their bases (fig. b). Nuchal epaulettes extend from the posterior margin of the prostomium to the fourth segment. Two pairs of tentacular cirri are on the first segment; the dorsal one is slender and about as long as the anterior antennae and the ventral cirrus is about one-third as long as the dorsal one. The first dorsal cirrus, on the second segment, is much longer than the remaining ones and about as long as the median antenna. The second and fourth dorsal cirri are about one-third as



Text-fig. 10. *Autolytus* (*Autolytus*) *magnus* BERKELEY, *Polybostrichus* stage. a, anterior end, in dorsal view, $\times 15$; b, same end, distal part of antennae and tentacular cirri are not shown, in ventral view, $\times 15$; c, parapodium of pre-epitokal region, in anterior view, $\times 30$; d, compound seta, $\times 1000$; e, parapodium of epitokal region, in anterior view, $\times 30$; f, bayonet seta from posterior parapodium, $\times 840$.

long as the first dorsal cirrus, and more posterior ones (fig. c) are shorter than these two but about equally long. Each dorsal cirrus consists of a basal cirrophore and a long, tapering style. Two ciliary bands extend across the dorsum of each segment; one band is between the bases of the dorsal cirri, and the other is along the anterior margin of the segment. Both sides of the body and the dorsal cirri have many pigmented ducts located beneath the epithelium. Parapodia have bidentate compound setae with a large, beak-shaped subdistal secondary tooth and the end of the shaft terminates in many spines (fig. d). They number about 40 in a fascicle in anterior, and diminish to about 20 in median segments. The simple, swimming setae are present in the median region and emerge from between the bases of dorsal cirri and neuropodial lobes (fig. e). A bayonet seta (fig. f) is present in the superior part of about the last ten parapodia.

Sacsonereis stage

(Text-fig. 11, a-d)

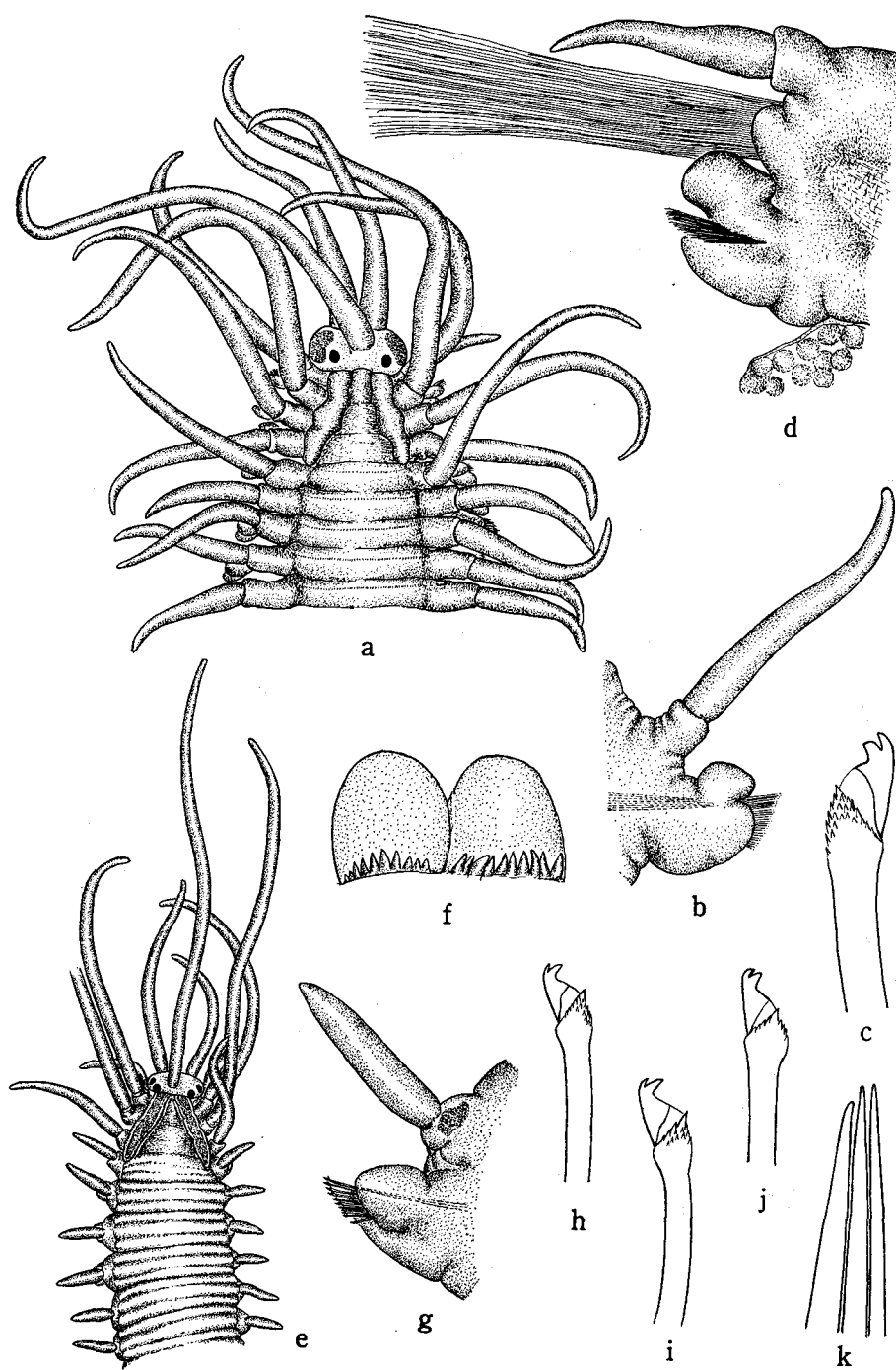
Collection: Off Shirikishinai, in plankton tows in May.

Description: Individuals measure 12 to 48 mm long and 1.8 to 4 mm wide including parapodia. The body consists of three regions. The anterior region has the prostomium, one achaetous, and 14 pre-epitokal segments; a median region has 24 to 37 epitokal segments with swimming setae, and a caudal region of 33 to 74 postepitokal segments followed by the pygidium.

The prostomium (fig. a) is broader than long. The dorsal and ventro-lateral eyes are reddish and the second are much the larger. A median antenna arises from the center of the prostomium; it extends back to the 18th segment. The paired antennae are slender and arise from the anterior margin of the prostomium; they are about half as long as the median one. Palpi are fused medially. Nuchal epaulettes are very distinct and extend from the posterior margin of the prostomium through the fourth segment. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan has 47 teeth arranged irregularly small and large. Dorsal tentacular cirri on the first segment are as long as the anterior antennae. Ventral cirri are about one-third as long as the dorsal ones. The first dorsal cirri are

Text-fig. 11. *Autolytus* (*Autolytus*) *magnus* BERKELEY, *Sacsonereis* stage. a, anterior end, in dorsal view, $\times 15$; b, 9th parapodium of pre-epitokal region, in posterior view, $\times 30$; c, compound seta, $\times 840$; d, 20th parapodium of epitokal region, in anterior view, $\times 30$.

Autolytus (*Autolytus*) *tamanus* n. sp. e, anterior end, in dorsal view, $\times 30$; f, a part of pharyngeal trepan opened by dissection, $\times 840$; g, 38th parapodium, in anterior view, $\times 84$; h, i, superior and inferior compound setae from 1st parapodium, $\times 840$; j, compound seta from median parapodium, $\times 840$; k, acicula from 1st parapodium, $\times 840$.



slightly shorter than the median antenna. The second are about two-thirds as long as the first. More posterior dorsal cirri are about two-thirds as long as the body is wide. Normal parapodia in the anterior region (fig. b) are bluntly conical; each has compound setae numbering about 120 in a bundle (fig. c). Acicula number 8 in an anterior parapodium and diminish to 3 in caudal segments.

In the median region of the body, dorsal cirri are shorter than those of the anterior region and about half as long as the body is wide (fig. d). The parapodium is large, bluntly conical; it is provided with long, simple hairlike swimming setae, emerging from under the dorsal cirrus. A bayonet seta is present in posterior parapodia.

All individuals have a large ventral sack containing large numbers of early embryo or larvae in the median region of the body; the embryos are light orange.

This *Sacconereis* is new to Japan.

Distribution: East and west coasts of Vancouver Island, British Columbia, Canada; Alaska; northern Japan.

Autolytus (Autolytus) tamanus n. sp.

(Text-fig. 11, e-k)

Collection: Karasu-jima near Tamano, in 2 m.

Description: A fragment lacking posterior end measures 8 mm long and 0.8 mm wide; it consists of 42 setigerous segments. The body is orange and has a brown spot on the base of each dorsal cirrus. The prostomium (fig. e) is broader than long and has two pairs of reddish eyes. A median antenna arises from the center of the prostomium and extends back to the 14th segment. Lateral antennae arise from the anterior margin of the prostomium and are about half as long as the median antenna. Two nuchal epaulettes extend from the hinder margin of the prostomium to the middle of the fourth segment. The proventriculus is in setigerous segments 4 to 6. The pharynx is S-shaped, and distally surrounded by 9 soft papillae. The trepan (fig. f) has a circlet of about 90 small subequal teeth, with 10 teeth to each of the 9 surrounding soft papillae. The tentacular segment is dorsally distinct from the next segment; dorsal tentacular cirri are about two-thirds as long as the median antenna, and ventral cirri are about one-third as long as the dorsal ones. The first dorsal cirri are about as long as the median antenna, and the second cirri are about one-third as long as the first ones. More posterior dorsal cirri are subequal in size and are half to one-third as long as the body is wide. Each segment is triannulated. A normal parapodium (fig. g) is bluntly conical and has a fascicle of compound setae; each

seta has a large secondary tooth. Setal appendages of the first parapodium (figs. h, i) have sharper, pointed secondary teeth than those of median parapodia (fig. j). Acicula (fig. k) number 2 to 3 in a parapodium; each is distally pointed.

The species is characterized as follows: the nuchal epaulettes extend through four segments and the trepan has about 90 small, subequal teeth.

Distribution: Southern Japan.

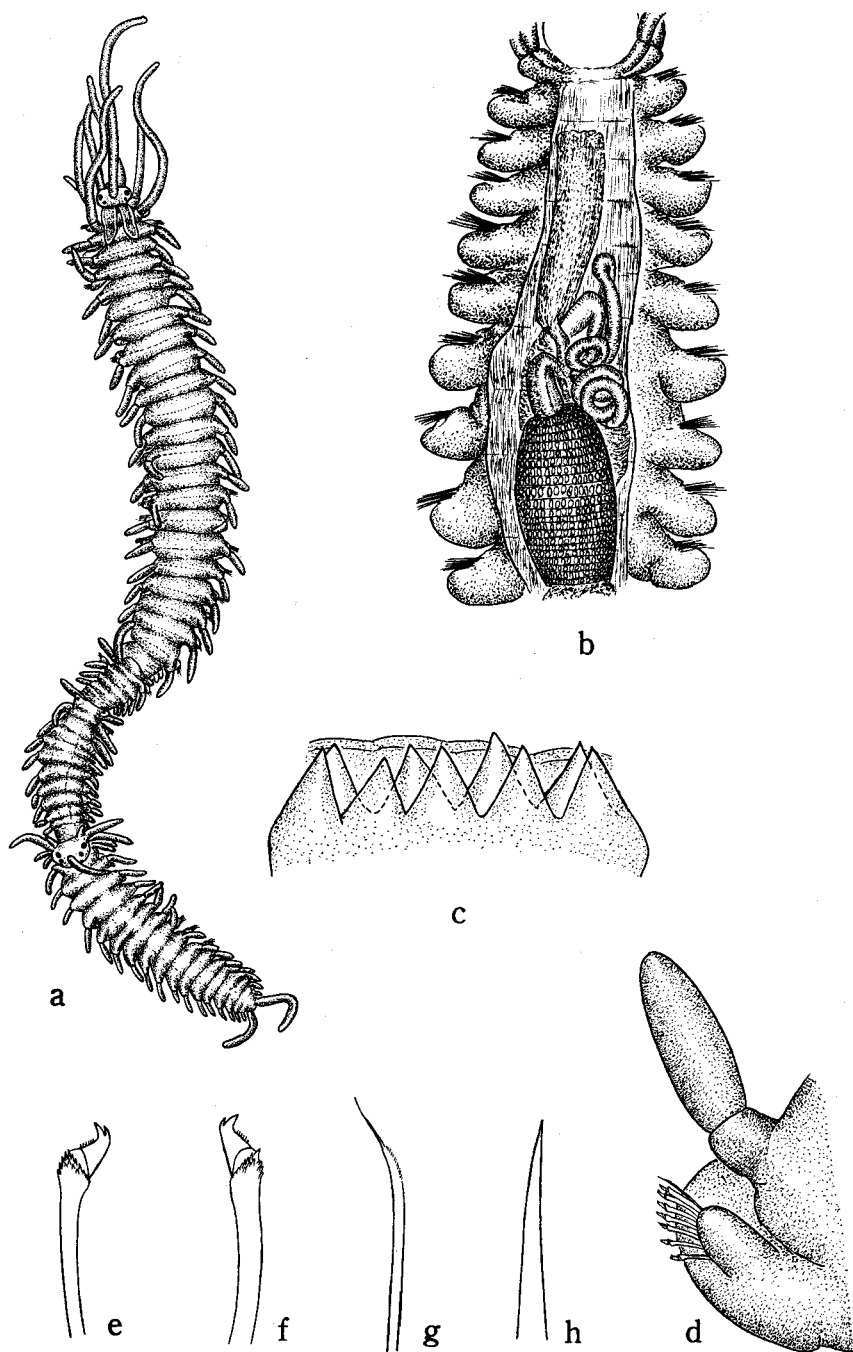
Autolytus (Regulatus) convolutus COGNETTI, 1953

(Text-fig. 12, a-h)

Autolytus convolutus COGNETTI, 1953, pp. 323-332, 7 figs., 1 pl.; 1957, pp. 71-72, fig. 15, pl. 2, figs. 14, 17, 18.

Collection: Asamushi, in intertidal zone among holdfasts of seaweed.

Description: The body measures 4.7 to 6.5 mm long and 0.5 to 0.6 mm wide; it is orange in life, without color pattern. All individuals show schizogenesis and are in the production of a chain of male stolons. The stolons are formed after the 22nd setigerous segment of the parent body and are youngest near the budding zone in a chain; posterior stolons consist of 16 to 20 setigerous segments (fig. a). The prostomium is broader than long, the width is about twice that of the length; the anterior margin is slightly rounded. There are two pairs of reddish eyes in trapezoidal arrangement; the anterior pair is larger than the posterior one. The median antenna arises from the center of the prostomium and extends back to the twelfth segment. Lateral antennae arise from the anterior margin of the prostomium and are about two-thirds as long as the median one. Two nuchal epaulettes extend from the posterior margin of the prostomium through the third, which is the second setigerous segment. The pharynx (fig. b) is irregularly coiled, not S-shaped as in most species of *Autolytus*; it is distally surrounded by 9 soft papillae. The trepan (fig. c) has a circlet of 9 large, equal teeth. The proventriculus is ellipsoid and extends from segment 8 to 10. The first segment has two pairs of tentacular cirri on each side; the dorsal pair is about half as long as the median antenna, and the ventral one is about half as long as the dorsal cirri. The first dorsal cirri, on the second visible segment, are slightly shorter than the median antenna. The second dorsal cirri are short and about half as long as the body is wide, and subequal to the length of the following cirri. The dorsum of each segment has one transverse ciliary band extending between the bases of the dorsal cirri. Parapodia are bluntly rounded and provided with setal fascicles emerging from between the two lobes (fig. d). Setae have a sharp, pointed secondary tooth with serrated cutting margin, and the distal end of the shaft terminates in fine spines (figs. e, f). A bayonet seta (fig. g) occurs from the first parapodium in the



Text-fig. 12. *Autolytus (Regulatus) convolutus* COGNETTI. a, entire animal with stolons in a chain, in dorsal view, $\times 30$; b, pharynx and proventriculus, in ventral view, $\times 75$; c, trepan, $\times 950$; d, 18th parapodium, in anterior view, $\times 190$; e, compound seta from 1st parapodium, $\times 950$; f, same from 18th parapodium, $\times 950$; g, bayonet seta, $\times 950$; h, aciculum, $\times 950$

superiormost part of the fascicle. One aciculum (fig. h) occurs in a parapodium.

Autolytus convolutus is characterized by having 9 large teeth in the trepan; the pharynx is coiled, not S-shaped, and the second dorsal cirri are as long as the following dorsal ones.

The species is new to Japan.

Distribution: Gulf of Naples, in 0-2 meters; northern Japan.

Autolytus (Regulatus) cornutus AGASSIZ, 1863

(Text-fig. 13, a-i)

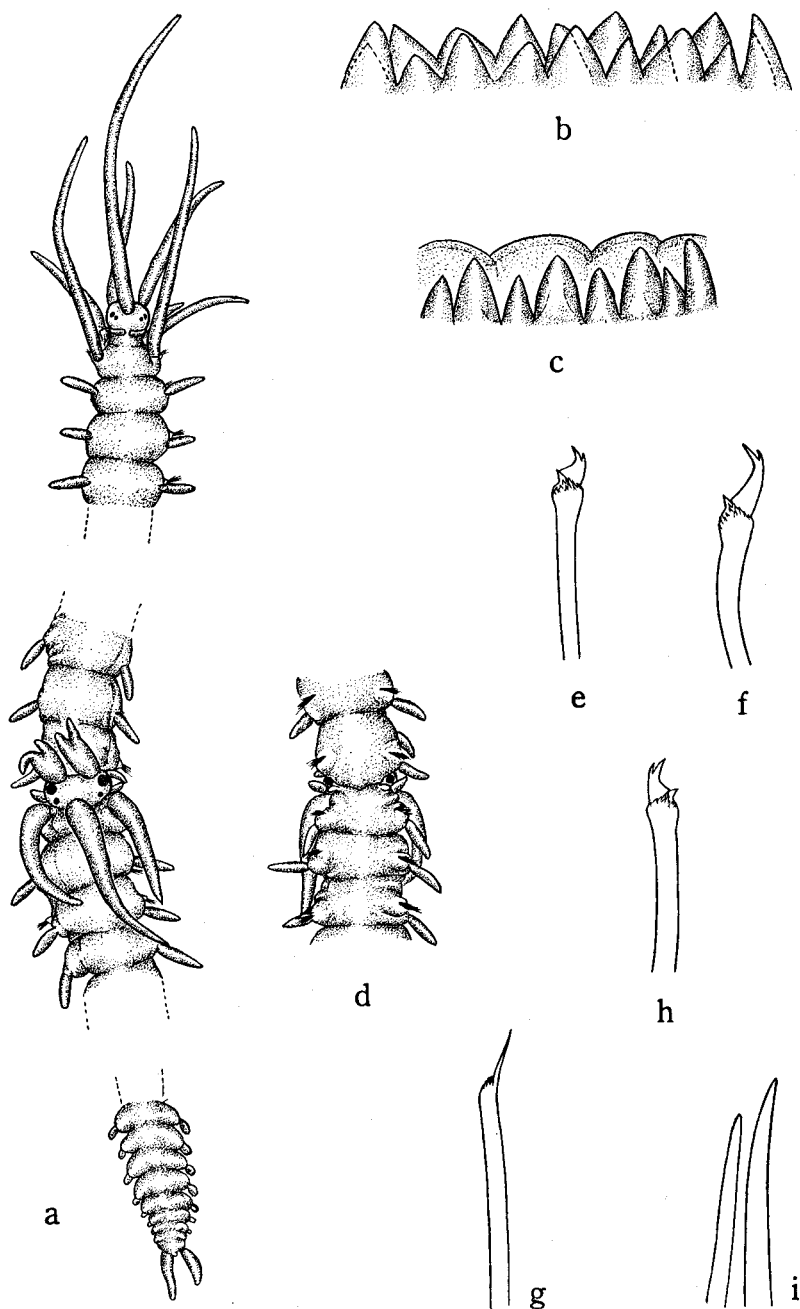
Autolytus cornutus OKADA, 1933, pp. 645-647, figs. 3, 4; PETTIBONE, 1963, p. 144, fig. 37e.

Autolytus ornatus HARTMAN, 1944, p. 338, pl. 13, fig. 5.

Collection: Onagawa, in intertidal zone among seaweed.

Description: The body is slender and measures 5 to 8 mm long and 0.5 to 0.7 mm wide; it consists of 35 to 45 setigerous segments. All individuals are atokous stocks with one male stolon formed singly; the head of the stolon arises between the 13th and the 14th setigerous segments (fig. a). The body is pale orange in life and without color markings. The prostomium is subglobular, slightly wider than long. Two pairs of eyes are reddish and the anterior one is slightly the larger. A median antenna arises between the anterior eyes and extends back to the seventh segment. Lateral antennae emerge from the anterior margin of the prostomium; they are about half as long as the median antenna. The two nuchal epaulettes are rudimentary and extend along the hinder margin of the prostomium on the tentacular segment. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan (figs. b, c) has a circlet of 18 teeth, 9 large alternating with 9 small teeth. The latter are about two-thirds the length of the former. The proventriculus is ovoid and extends from the median part of the fourth to the fifth segment. Dorsal tentacular cirri are slightly shorter than the lateral antennae and ventral cirri are about half as long as the dorsal ones. The first dorsal cirri are about twice as long as the dorsal tentacular cirri. The second dorsal cirri are only slightly longer than those following; they are about half as long as the body is wide.

The head of the male stolon, arising between the 13th and 14th setigerous segments, has a pair of bifurcate lateral antennae, a median antenna extending through four segments and two pairs of eyes. The dorsal tentacular cirri extend through three segments and ventral cirri are small, conical (fig. d). A normal parapodium is bluntly conical and has a fascicle of compound setae. The first parapodium has two kinds of compound setae: the appendages of the superior setae (fig. e) are about half the length of the



Text-fig. 13. *Autolytus (Regulatus) cornutus* AGASSIZ. a, entire body, divided into three divisions, $\times 30$; b, pharyngeal trepan, $\times 950$; c, a part of same trepan opened by dissection, $\times 950$; d, median division of body, in ventral view, $\times 30$; e, superior compound seta from 1st parapodium, $\times 950$; f, inferior seta from same parapodium, $\times 950$; g, bayonet seta, $\times 950$; h, compound seta from 20th parapodium, $\times 950$; i, acicula from 1st parapodium, $\times 950$.

inferior ones (fig. f); each has a sharply pointed, secondary tooth and the cutting margin is smooth.

A bayonet seta (fig. g) is present in the superior part of the setal fascicle from the first through posterior parapodia. The median parapodium has one kind of compound seta (fig. h). Acicula number 2 in anterior parapodia and only one posteriorly. The pygidium has two long anal cirri.

The species is new to Japan.

Distribution: Labrador to Chesapeake Bay on the east coast of North America; Plymouth, England; Japan.

Autolytus (Regulatus) prismaticus (FABRICIUS, 1780)

Autolytus incertus MALMGREN, 1867, p. 155, pl. 7, fig. 40.

Autolytus gracilis VERRILL, 1874, p. 132.

Autolytus prismaticus MARENZELLER, 1892, p. 420; PETTIBONE, 1954, p. 249, fig. 29a-b; 1963, p. 139, fig. 37d; IMAJIMA and HARTMAN, 1964, pp. 99-100, pl. 21, figs. a-g.

Collection: Shirikishinai, in shallow waters and in 40 to 140 meters in laminarian holdfasts; off Cape Shiriyazaki, in 140 to 360 m; Onagawa and Asamushi, in intertidal zone among seaweed colonies.

Description: A large individual measures 20 mm long and 1 mm wide including parapodia, and consists of 85 setigerous segments. The dorsum is pale yellow and has three longitudinal black bands which extend throughout the length; the median band is broadest and occupies about a fourth of the width of the body; the paired ones are narrower and located near the inner bases of the dorsal cirri. The prostomium is broader than long; the three antennae are long and slender; the median one arises between the anterior eyes and extends back to the eleventh segment; the lateral ones arise from the anterior margin of the prostomium and are about three-fifths as long as the median one. Two pairs of eyes are reddish, and the anterior pair is larger than the posterior one. Two nuchal epaulettes arise from the posterior margin of the head-lobe and extend only through the first segment. The pharynx is long, S-shaped and distally surrounded by 9 large, soft papillae. The trepan has a circlet of 18 teeth arranged so that 9 large alternate with 9 small teeth. The larger ones are about twice as large as the small ones. The proventriculus is long and extends from segment 8 to 11. Each of the dorsal tentacular cirri on the first segment is about half as long as the median antenna, and the corresponding ventral cirri are about half as long as the dorsal ones. The dorsal cirri on the second segment are about as long as the median antenna, and more posterior dorsal cirri are about half as long as the body is wide. Parapodia are bluntly rounded and armed with setal fascicles

emerging from between the two lobes. Setae are all compound, having a large subdistal secondary tooth. Posterior parapodia have a bayonet seta located in the superior-most part of the fascicle. Acicula number 2 to 3 in a parapodium; each tapers distally. The pygidium has two long anal cirri.

Distribution: Widely distributed in the Arctic; Greenland; Iceland; Bering Sea to British Columbia; Barents Sea; north Japan Sea; northern Japan.

Autolytus (Regulatus) okadai n. sp.

(Text-fig. 14, a-i; Text-fig. 15, a-h)

Autolytus fallax PETTIBONE, 1954, pp. 247-249, fig. 29, c-f. (not MALMGREN, 1867).

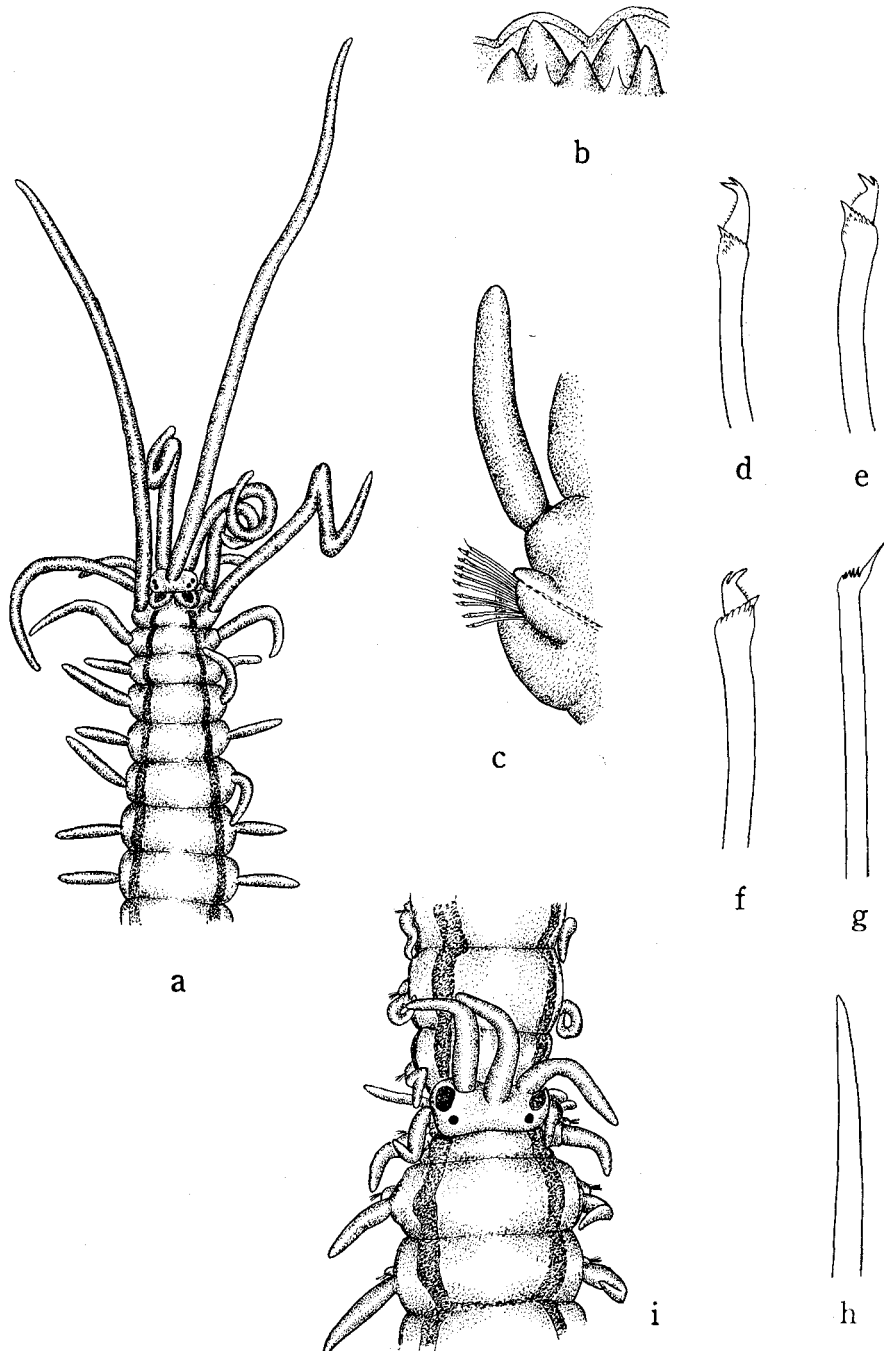
Autolytus species, epitokous individuals *Polybostrichus* (male), stage A, IMAJIMA and HARTMAN, 1964, pp. 101-103, pl. 21, fig. h; pl. 22, figs. a-c.

Atokous form

(Text-fig. 14, a-i)

Collection: Asamushi; Onagawa; Karasu-jima near Tamano, in intertidal zone.

Description: The largest specimen measures 11 mm long and 0.7 mm wide; it consists of 65 setigerous segments. The dorsum is pale yellow and has two longitudinal black bands extending throughout the body; they are located at the dorso-lateral side (fig. a). Some individuals have narrow indistinct black bands along the bases of the dorsal cirri. The prostomium is broader than long; it has two pairs of reddish eyes. A median antenna arises from the center of the prostomium and extends back to the 14th setigerous segments. Lateral antennae arise from the anterior margin of the prostomium; they are about half as long as the median one. Two nuchal epaulettes are located on the tentacular segment; each is foliaceous and the inner part is pigmented. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan (fig. b) has 18 teeth, 9 large alternating with 9 small teeth; the small teeth are about half the length of the large teeth. The proventriculus extends to the eighth or ninth segments. Dorsal tentacular cirri are about as long as the lateral antenna and ventral cirri are about two-thirds as long as the dorsal ones. The first dorsal cirri are about three-fourths as long as the median antenna. The second dorsal cirri are about two-thirds as long as the first one, and are about twice to three times as long as the following dorsal cirri. A normal parapodium (fig. c) is bluntly conical and has a fascicle of compound setae; each seta has a sharp, pointed secondary tooth larger than the terminal one and a minutely serrated cutting margin (figs. d, e, f). A bayonet seta (fig. g) is first present from the third to thirteenth



Text-fig. 14. *Autolytus (Regulatus) okadai* n. sp., *Atokous* form a, anterior end, in dorsal view, $\times 30$; b, a part of pharyngeal trepan opened by dissection, $\times 950$; c, median parapodium, in anterior view, $\times 120$; d, e, compound setae from 1st parapodium, $\times 950$; f, same seta from median parapodium, $\times 950$; g, bayonet seta, $\times 950$; h, aciculum, $\times 950$; i, anterior end of sexual stolon arising between setigers 13 and 14, $\times 35$.

parapodia; each is as wide as the compound seta. Acicula (fig. h) are pale yellow and usually single in parapodia; each one tapers to a pointed tip.

A female stock produces female stolons singly; the head is newly formed between setigerous segments 13 and 14 (fig. i), and swimming setae arise from the seventh setigerous segment of the newly formed stolon.

Autolytus okadai was compared and found to agree with *A. fallax* PETTIBONE (1954, p. 247), from Alaska. *A. okadai* from Japan and Alaska may be distinguished from *A. fallax* MALMGREN (1867) from Spitsbergen, in the following aspects: the dorsum has two very distinct, longitudinal black bands, which are lacking in *A. fallax*, and the second dorsal cirri are about twice as long as following ones, instead of equal to the following cirri.

The species resembles *A. prismaticus* in many aspects. However, they may be distinguished in that; (1) the first has two instead of three longitudinal color bands, and (2) the first is small in size and about half as large as the second.

Through the courtesy of Dr. G. HARTWICH, some atokous specimens of *Autolytus pictus* (EHLERS) from North Sea and Algérie were examined. These specimens closely resemble *A. okadai* in having following characters; (1) the dorsum has two longitudinal bands located at each side; (2) the trepan has a circlet of 9 large and 9 small teeth and (3) dorsal cirri are all subequal except the first two segments.

A. okadai differs from *A. pictus* in that the nuchal epaulettes are present on one segment in the first and on two segments in the second; in *A. okadai* the dorsum has two longitudinal bands on each side near the bases of the dorsal cirri, the rest of the animal is yellowish; in *A. pictus* the dorsum is brownish with an unpigmented longitudinal band.

Polybostrichus stage

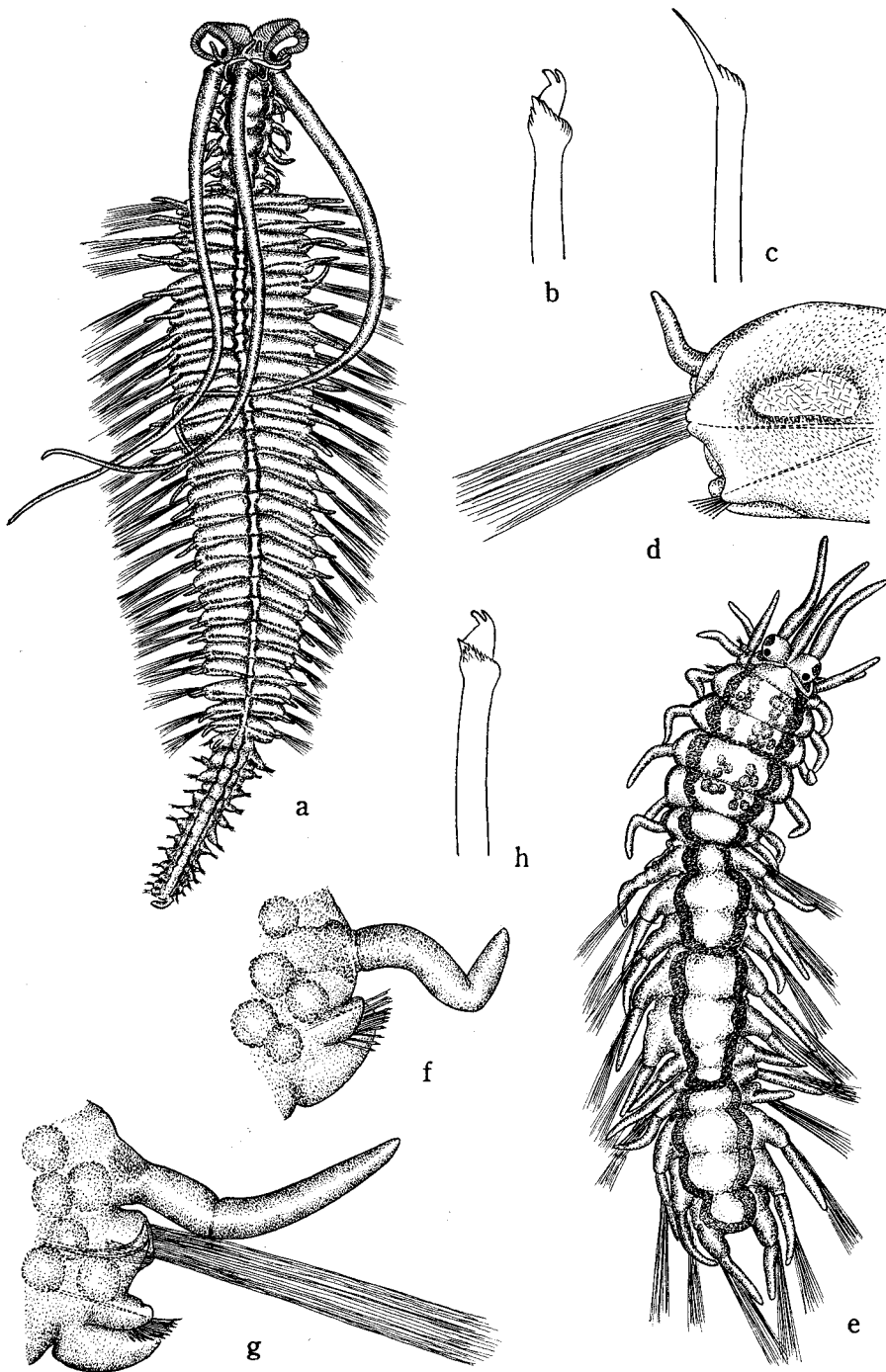
(Text-fig. 15, a-d)

Collection: Off Shirikishinai, in July to August and Misaki, in April, in surface tows with plankton nets.

Description: The body measures 5 to 6 mm long and about 1 mm wide excluding the setae; it consists of three regions: (1) the prostomium, tentacular segment and 6 pre-epitokal segments; (2) 26 to 28 epitokal segments, and (3) 10 to 12 post-epitokal segments and pygidium (fig. a). The body is

Text-fig. 15. *Autolytus (Regulatus) okadai* n. sp., *Polybostrichus* stage. a, entire body, in dorsal view, $\times 15$; b, compound seta, $\times 1000$; c, bayonet seta, $\times 1000$; d, parapodium from epitokal region, $\times 60$.

Sacconereis stage. e, entire body, in dorsal view, $\times 30$; f, 3rd parapodium from pre-epitokal region, in anterior view, $\times 85$; g, 10th parapodium from epitokal region, in anterior view, $\times 85$; h, compound seta, $\times 840$.



pale yellow and has two longitudinal dark bands, widely separated from each other; thereafter these two bands approach in the middorsum and continue to the posterior end of the body. The prostomium is broader than long and has a straight frontal margin. It has two pairs of eyes; the ventral eyes are about twice as large as the dorsal ones. The large paired antennae are thick at their bases and bifurcated at their midlength. There are two short frontal lobes located near the anterior margin of the prostomium. A median antenna is thick and extends back to the 28th setigerous segments. Palpi are lacking. A pair of nuchal epaulettes is present on the first segment, as also three pairs of tentacular cirri; the anterior dorsal pair is similar to the following dorsal cirri; the ventral one is about half as long as the dorsal one, and the posterior dorsal cirri are very long and similar to the median prostomial antenna, which has a pair of achaetous knobs at its ventral base. The first six pre-epitokal segments are similar to one another and have normal setae. Each has a slender dorsal cirrus with black pigment and a fascicle of bidentate compound setae (fig. b). A bayonet seta (fig. c) is present from the first parapodium. Each segment of the epitokal region has a transverse black band extending from the posterior margin of the middorsum to the base of the dorsal cirrus. Parapodia (fig. d) have very long, hairlike, simple, swimming setae emerging between the base of the dorsal cirri and the neuropodial lobe. Parapodia in post-epitokal segments diminish in size and dorsal cirri are gradually shorter.

Many individuals of *Polybostrichus* stage of *Autolytus pictus* from Algérie were examined and were compared with *A. okadai*. There agree closely in many aspects, but *A. pictus* has 32 to 33 epitokal segments, instead of 10 to 12; the dorsum in pre-epitokal region is brownish, instead of yellowish.

Sacconereis stage

(Text-fig. 15, e-h)

Collection: Onagawa, in intertidal zone among seaweed, in June.

Description: A single individual measures 3 mm long and 0.6 mm wide. It consists of 6 pre-epitokal segments and 11 epitokal segments with swimming setae; a post-epitokal region is lacking (fig. e). The dorsum has four longitudinal black bands; two along the bases of the dorsal cirri are narrow and absent from the epitokal region. The prostomium is broader than long; there are two pairs of eyes, with the ventrolateral larger than the dorsal ones. A median antenna arises from the center of the prostomium; it extends back to the fourth setigerous segment. The lateral antennae arise from the anterior margin of the prostomium and are as long as the median one. Palpi are lacking. Nuchal epaulettes are present on the tentacular

segment. The tentacular segment has a pair of dorsal and ventral cirri, and two small achaetous knobs at the lower base of the ventral tentacular cirri. The first dorsal cirri are slightly shorter than the dorsal tentacular cirri and as long as the body is wide. Dorsal cirri of epitokal segments are longer than those of the pre-epitokal ones (fig. f); each has a long cirrophore (fig. g). The hairlike swimming setae emerge from under the dorsal cirri; two curved acicula are imbedded in the bases of swimming setal bundle. Each compound seta (fig. h) has a large secondary tooth; the cutting margin is smooth. A bayonet seta occurs from the first parapodium. The body cavity is crowded with ova.

Distribution: Alaska; northern to southern Japan.

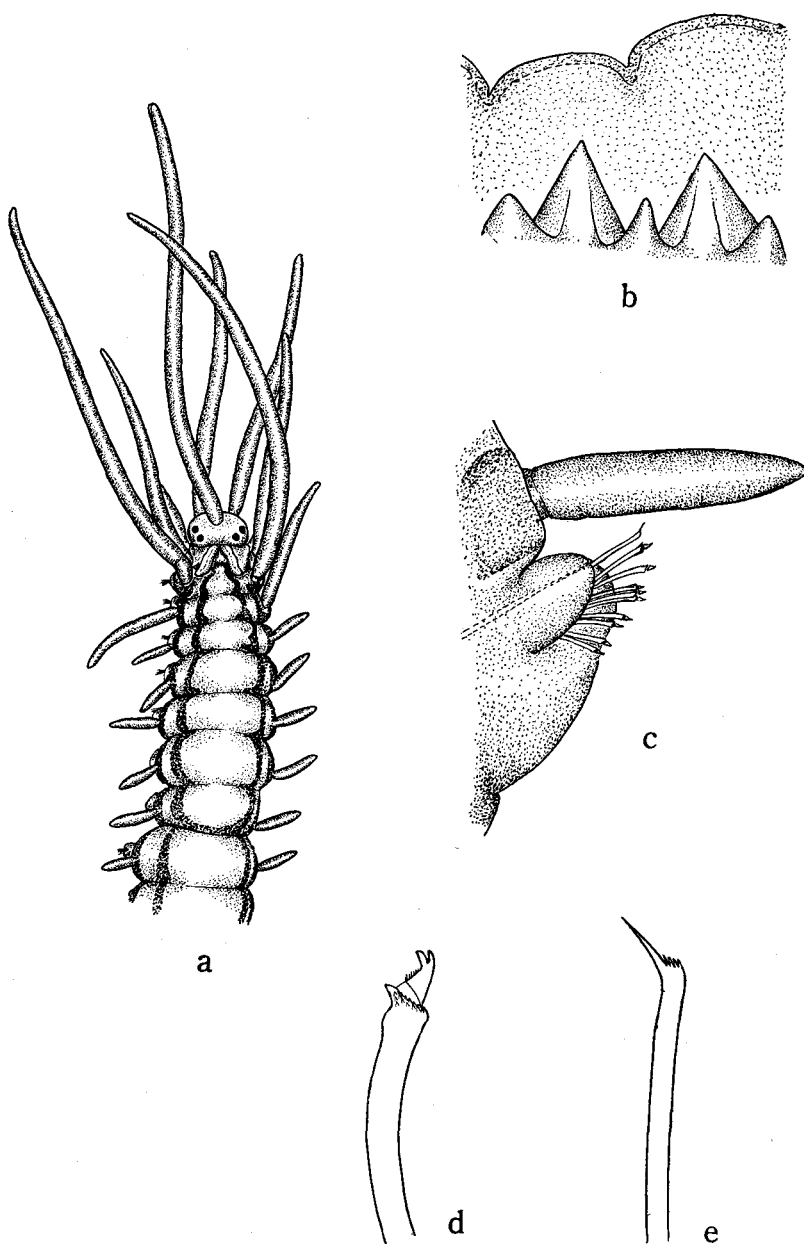
Autolytus (Regulatus) kiiensis n. sp.

(Text-fig. 16, a-e)

Collection: Seto, in intertidal zone.

Description: The largest of four anterior fragments measures 4 mm long and 0.5 mm wide for 22 setigerous segments. The body (fig. a) is pale yellow and has four longitudinal black bands; two are located dorso-laterally, widely separated from each other, and two others extend through the bases of the dorsal cirri. The prostomium is broader than long and has a rounded frontal margin. There are two pairs of reddish eyes. A median antenna arises between the anterior eyes and extends back to the eleventh segment. Lateral antennae arise from the anterior margin of the prostomium; each is slightly shorter than two-thirds the length of the median one. Two nuchal epaulettes extend from the hinder margin of the prostomium to the anterior part of the second segment; they are slightly sinuous and not foliaceous as those of *Autolytus okadai*. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan (fig. b) has a circlet of 18 teeth alternating 9 large and 9 small teeth. The proventriculus is ovoid and extends through segments 7 and 8. Dorsal tentacular cirri are about half as long as the median antenna. Ventral tentacular cirri are about one-third as long as the dorsal one. The first dorsal cirri are as long as the median antenna. The second cirri are about one-third as long as the median antenna. Thereafter, all posterior cirri are subequal in length, each about half as long as the body is wide. Parapodia (fig. c) are bluntly rounded and have setal fascicles emerging from between two lobes. Composite setae are distally bidentate; the secondary tooth is larger than the terminal one (fig. d). A simple bayonet seta (fig. e) is present from the first parapodium. Acicula number two in each parapodium.

Autolytus (R.) kiiensis resembles *A. prismaticus* and *A. okadai*. The first is



Text-fig. 16. *Autolytus (Regulatus) kiiensis* n. sp. a, anterior end, in dorsal view, $\times 35$; b, a part of pharyngeal trepan opened by dissection, $\times 950$; c, 10th parapodium, in anterior view, $\times 190$; d, compound seta, $\times 950$; e, bayonet seta, $\times 950$.

characterized as follows: (1) the dorsum has four, instead of two longitudinal black bands; (2) nuchal epaulettes are slightly sinuous, instead of triangular as *A. prismaticus* or foliaceous as in *A. okadai*, and (3) a bayonet seta occur from the first, instead of a later parapodium.

Distribution: Southern Japan.

Autolytus (Regulatus) vulgarius n. sp.

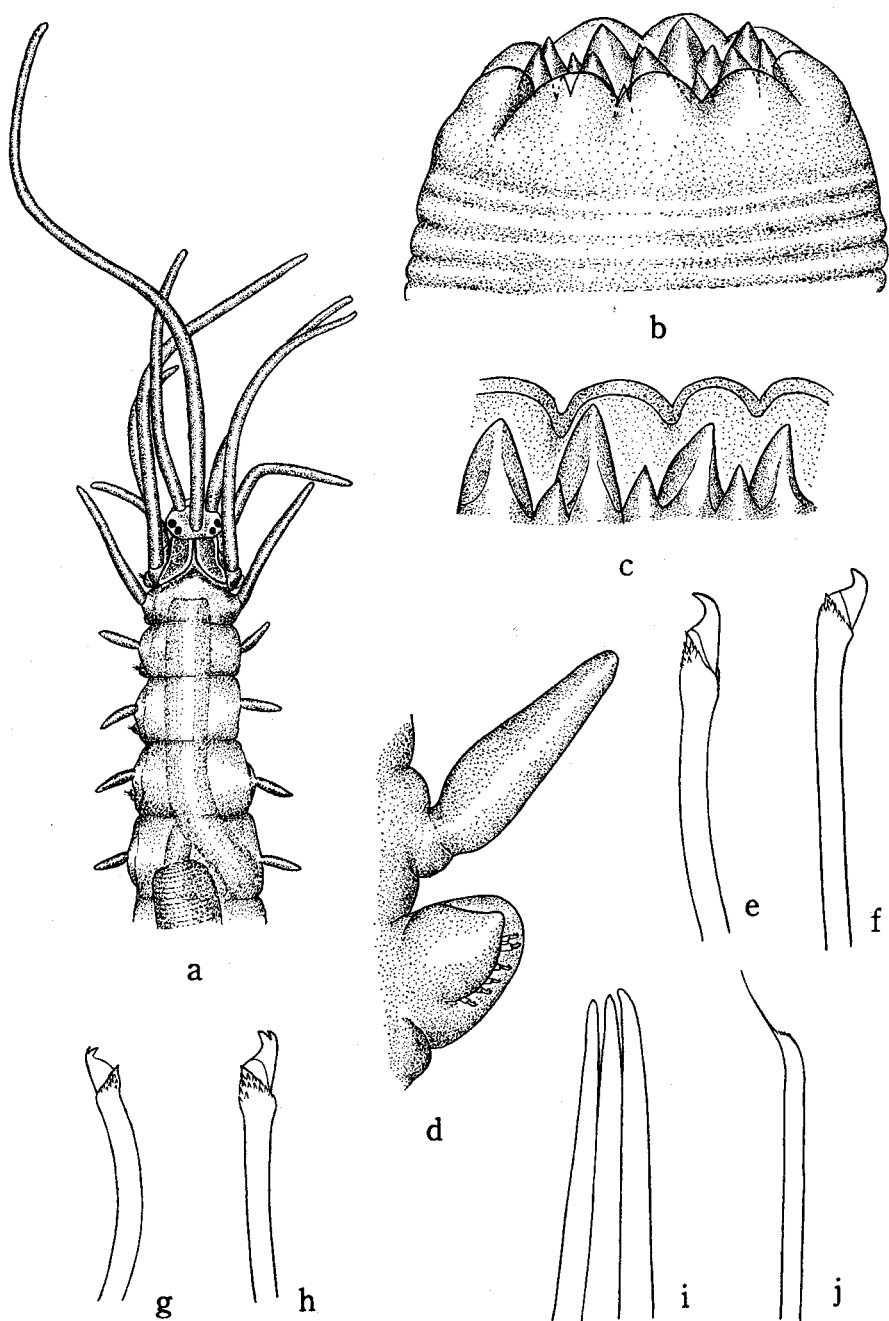
(Text-fig. 17, a-j)

Autolytus monoceros FAUVEL, 1934, pp. 313-314.

?*Autolytus monoceros* OKUDA, 1938, p. 91; IMAJIMA and HARTMAN, 1964, p. 95.

Collection: Asamushi; Onagawa; Misaki; Sugashima; Seto; Tamano; Mukaishima; Usa; Noto-ogi, in intertidal zone.

Description: The largest individual measures 21 mm long and 1 mm wide including parapodia; it consists of 95 setigerous segments. The body is orange and lacks color markings. The prostomium (fig. a) is broader than long. Two pairs of reddish eyes are in trapezoidal arrangement. A median antenna arises from the center of the prostomium and extends back to the 10th segment. Lateral antennae arise from the anterior margin of the prostomium; each is about half as long as the median one. Dorsal tentacular cirri are about one-third as long as the median antenna and ventral cirri are about half as long as the dorsal one. These antennae and tentacular cirri are translucent, with orange tips. Nuchal epaulettes are broad and medially fused; they extend from the posterior margin of the prostomium to the hinder margin of the second segment. The pharynx is S-shaped and distally surrounded by 9 soft papillae (fig. b). The trepan has a circlet of 18 teeth, alternating 9 large and 9 small teeth (fig. c). The proventriculus extends to setigerous segment 8 to 11, 10 to 13 or 11 to 14. The first dorsal cirri are about two-thirds as long as the median antenna. The second dorsal cirri are about one-third as long as the first one. The remaining dorsal cirri (fig. d) are subequal in size and half to one-third as long as the body is wide. The first setal fascicle consists of unidentate compound setae; each seta has a distal fang curved nearly at right angle to the shaft; appendages of superior setae (fig. e) are longer than the those of inferior ones (fig. f) and the cutting margin is smooth. The second parapodium has setae similar to these of the first parapodium and some transitional bidentate setae (figs. f, g); setae of each kind are nearly equal in number. The third parapodium has a fascicle of bidentate setae and 1 or 2 unidentate setae similar to those of the first two segments. The fourth parapodium has only bidentate setae (fig. h). Parapodia are supported by 2 to 4 acicula; each is a straight rod



Text-fig. 17. *Autolytus (Regulatus) vulgaris* n. sp. a, anterior end, in dorsal view, $\times 30$; b, distal part of pharynx showing soft papillae and pharyngeal trepan, $\times 300$; c, a part of pharyngeal trepan opened by dissection, $\times 480$; d, median parapodium in anterior view, $\times 190$; e, superior unidentate seta from 1st parapodium, $\times 950$; f, inferior unidentate seta from same parapodium, $\times 950$; g, transitional bidentate seta, $\times 950$; h, bidentate compound seta from 4th parapodium, $\times 950$; i, acicula from anterior parapodium, $\times 950$; j, bayonet seta, $\times 950$.

with a blunt tip (fig. i). A bayonet seta (fig. j) is first present between the 14th to the 40th parapodia.

An individual taken at Usa in May, had a single sexual stolon, with its head forming between setigers 16 and 17 of the stock.

Autolytus (Regulatus) vulgaris is characterized as follows: (1) the nuchal epaulettes are present through two segments; (2) the trepan has 18 teeth alternating 9 large and 9 small teeth; (3) the first parapodium has only unidentate compound setae, the second and third parapodia have unidentate and transitional bidentate setae, and from the fourth parapodium they are entirely replaced by bidentate compound setae.

Autolytus brevicirrata WINTERNITZ (1936) from Florida has unidentate compound setae in all parapodia, instead of limited to the first three parapodial segments.

Five individuals, reported as *Autolytus monoceros* FAUVEL (1934) from Seto were re-examined. They have no nuchal lobe on the second segment as described by AUGENER (1913) but are slightly elevated between the nuchal epaulettes extending to posterior margin of the second segment. The pharynx terminates in 9 soft papillae and the trepan has a circlet of 18 teeth arranged so that 9 large alternate with 9 small teeth. Setae and parapodia correspond with those of this species.

A. monoceros OKUDA (1938) from Izu Peninsula was not described and the specimen was not preserved; it may refer to this species.

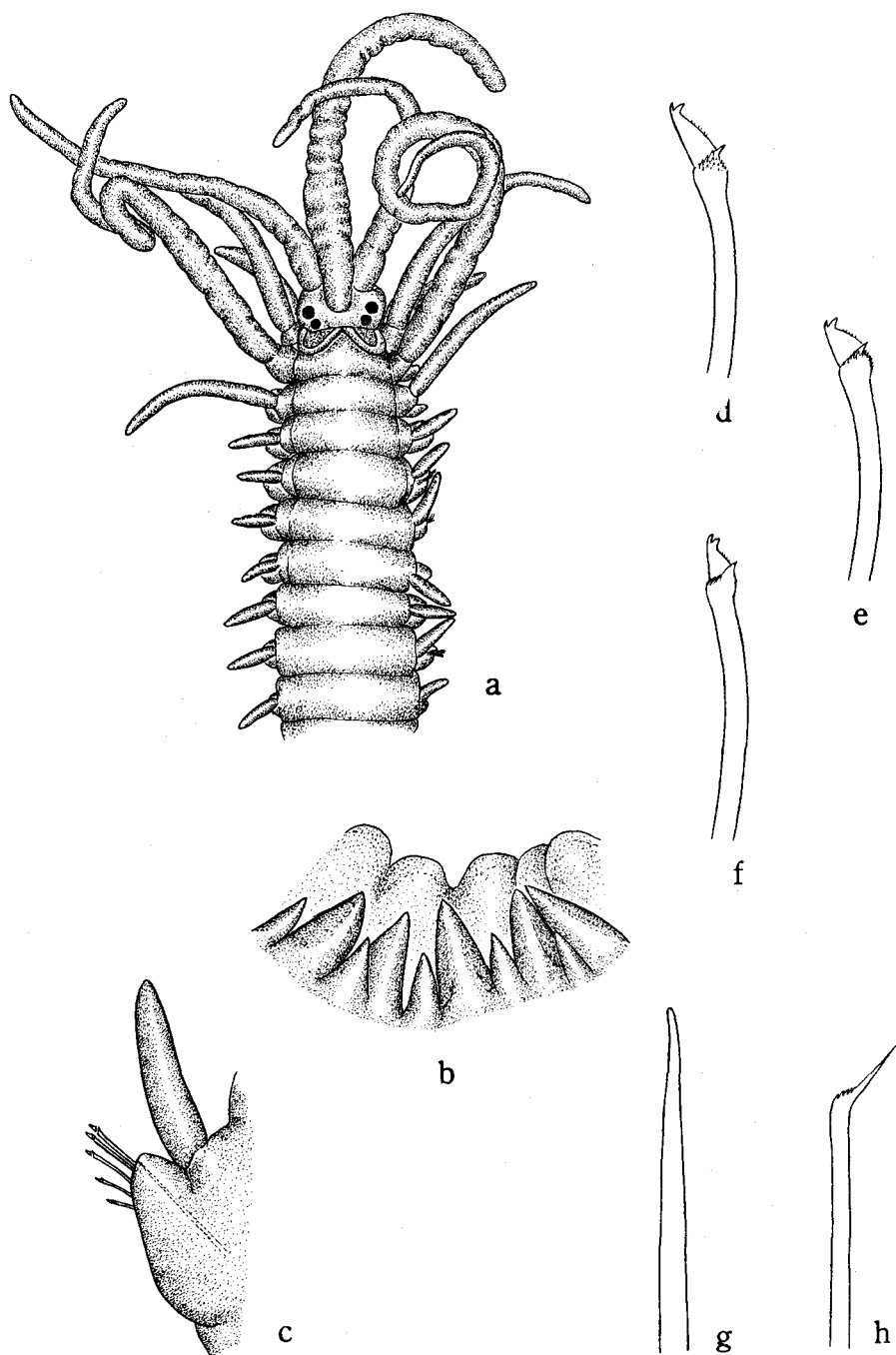
Distribution: Common in Honshu and Shikoku.

Autolytus (Regulatus) misakiensis n. sp.

(Text-fig. 18, a-h)

Collection: Misaki; Onagawa, in intertidal zone.

Description: The larger of two individuals measures 6.5 mm long and 0.7 mm wide; it consists of 69 setigerous segments. The body is orange, without color markings. The prostomium (fig. a) is broader than long. Two pairs of reddish eyes are in trapezoidal arrangement and the anterior pair is slightly the larger. Palpi are medially fused. A median antenna arises from the center of the prostomium; its distal end was injured. Lateral antennae arise from the anterior margin of the prostomium and extend back to the 10th segment. Nuchal epaulettes emerge from the posterior margin of the prostomium and are present only on the tentacular segment; they are subtriangular. The trepan (fig. b) has a circlet of 18 teeth alternating 9 large and 9 small ones. The proventriculus is present in setigerous segments 7 to 10. Dorsal tentacular cirri are slightly shorter than the lateral antennae and ventral cirri are about half as long as the dorsal one. The first dorsal cirri extend back to the 14th segment. The second cirri are about



Text-fig. 18. *Autolytus (Regulatus) misakiensis* n. sp. a, anterior end, in dorsal view, $\times 55$; b, a part of pharyngeal trepan opened by dissection, $\times 190$; c, 20th parapodium, in posterior view, $\times 190$; d, e, superior and inferior compound setae from 1st parapodium, $\times 950$; f, compound seta from median parapodium, $\times 950$; g, aciculum from 1st parapodium, $\times 950$; h, bayonet seta, $\times 950$.

one-third as long as the first ones. The succeeding cirri are equal in size and half to one-third as long as the body is wide (fig. c). The first parapodium has a fascicle of compound setae; the setal appendage is minutely serrated at the cutting margin and its tip is distinctly bidentate; superior appendages are longer than the inferior one (figs. d, e). Setae in median parapodia have shorter appendages (fig. f). Acicula (fig. g) occur singly in a parapodium and each is distally blunt. A bayonet seta (fig. h) is present in posterior parapodia.

Autolytus misakiensis is characterized as follows: (1) the nuchal epaulettes are present only on the first segment; (2) the pharynx has 9 large and 9 small teeth, alternating large and small; (3) the dorsum of the body has no color markings, and (4) a bayonet seta is present in posterior parapodia.

A. misakiensis may be distinguished from other species of subgenus *Regulatus* as follows; *A. prismaticus*, *A. okadai* and *A. kiiensis* have longitudinal black bands on the dorsum throughout the body, instead of no color markings. *A. cornutus* and *A. vulgaris* have no color bands as in *A. misakiensis*. The last is distinguishable from *A. cornutus* in having the second dorsal cirri longer, instead of equal to the succeeding cirri, and the first has a bayonet seta only in posterior parapodia, whereas the second has one in all parapodia. *A. misakiensis* differs from *A. vulgaris* in having bidentate, instead of unidentate compound setae in the first parapodium.

Distribution: Central Japan.

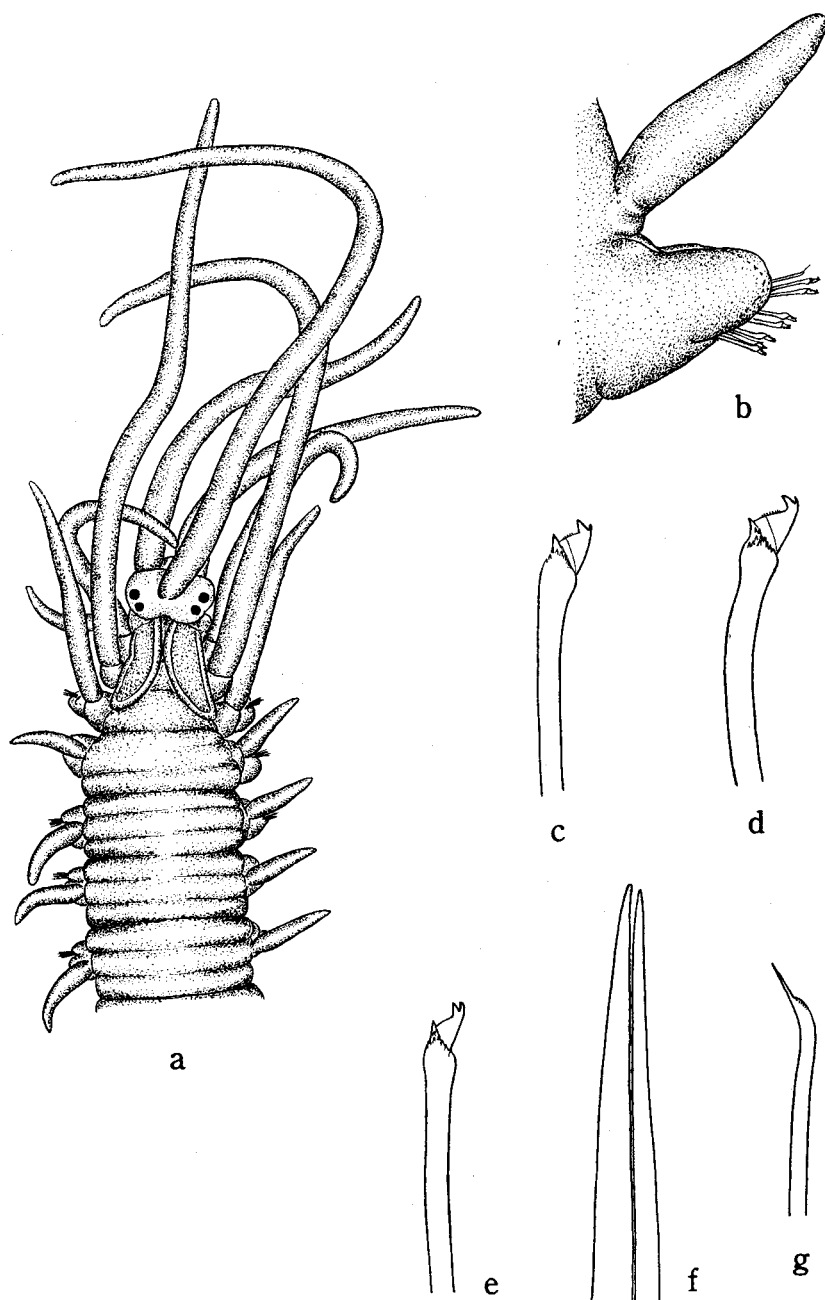
Autolytus (Regulatus) misakiensis longilappetus n. subsp.

(Text-fig. 19, a-f)

Collection: Onagawa, in the intertidal zone.

Description: The largest specimen measures 16 mm long and 0.8 mm wide for 115 setigerous segments. The body is orange and lacks color markings. Segments are triannulated. The prostomium, eyes, antennae, dorsal cirri, pharynx and trepan are closely allied to the stem, *A. misakiensis*, from Misaki and Onagawa. The proventriculus is present in setigerous segments 8 to 12. A pair of nuchal epaulettes extends from the posterior margin of the prostomium to the middle of the third segment (fig. a). All parapodia (fig. b) have bidentate compound setae. Setae from the first parapodium are transitional to bidentate; the secondary tooth is much the longer (figs. c, d). Composite setae in more posterior parapodia are entirely bidentate (fig. e). Acicula number two in anterior (fig. f), and one in more posterior parapodia. A bayonet seta (fig. g) is first present from the 10th parapodium.

The subspecies differs from the stem, *A. misakiensis* in the nuchal epaulettes and the number of acicula in the anterior parapodia; the nuchal epaul-



Text-fig. 19. *Autolytus (Regulatus) misakiensis longilappetus* n. subsp. a, anterior end, in dorsal view, $\times 55$; b, median parapodium, $\times 190$; c, d, superior and inferior compound setae from 1st parapodium, $\times 950$; e, compound seta from median parapodium, $\times 950$; f, acicula from 1st parapodium, $\times 950$; g, bayonet seta, $\times 950$.

lettes of the first extend through three, instead of one segment, and anterior acicula number two, instead of only one.

Distribution: Northern Japan.

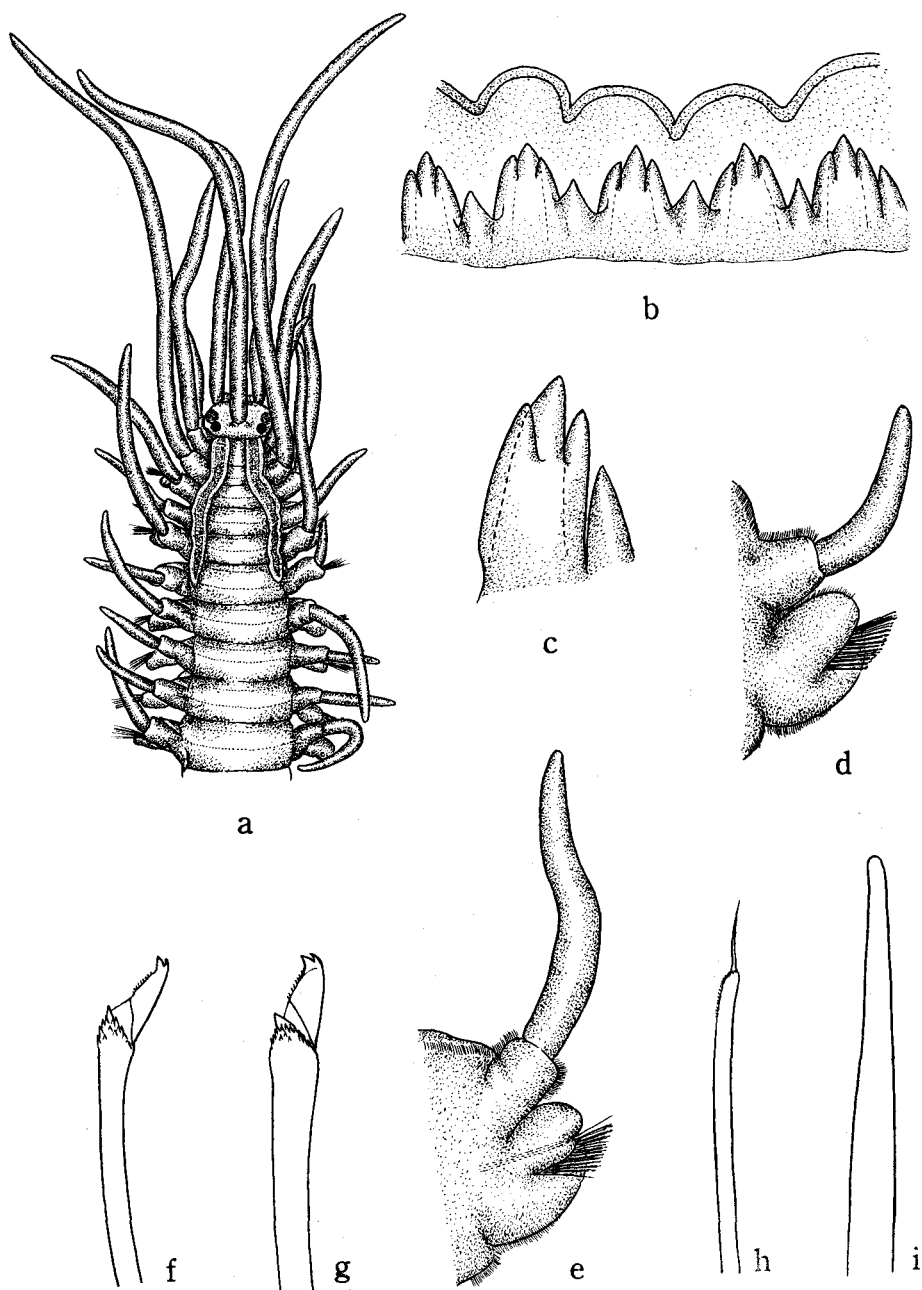
Autolytus (Regulatus) usaensis n. sp.

(Text-fig. 20, a-i).

Collection: Usa, among *Halocynthia* (ascidian) attached to the float; Karasujima, near Tamano, in 2 m.

Description: Individuals measure 5.5 to 9 mm long and 0.5 to 0.8 mm wide; they consist of 47 to 58 setigerous segments. The body is orange and there are no color markings. The prostomium is broader than long; there are two pairs of reddish eyes and the anterior pair occurs on the ventral side. A median antenna arises from the center of the prostomium and extends back to the 12th segment. Paired lateral antennae arise from the anterior margin of the prostomium and are two-thirds as long as the median antenna. Two long nuchal epaulettes (fig. a) well separated medially arise at the hinder margin of the prostomium; each extends back to the sixth segment. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan (fig. b) has a circlet of 9 large trifid teeth and 9 smaller simple teeth in alternate series; each of the trifid teeth consists of a large middle and a pair of smaller lateral fangs fused basally for two-thirds of the length, seen in inner view (fig. c). In outer view the trepan has a circlet of 9 large, 18 median and 9 small teeth. The proventriculus extends to setigerous segment 8 to 10. Each segment is crossed by two ciliary bands on the dorsal and ventral side of the body; the anterior band is along the anterior margin of the segment; the posterior one is between the bases of the dorsal cirri. Dorsal tentacular cirri are as long as the lateral antenna. Ventral cirri are half as long as the dorsal ones. The first dorsal cirri are slender and much longer than the median antenna. The second cirri are about two-thirds the length of the first cirri. Thereafter, the dorsal cirri alternate long and short throughout the body; the long cirri are as long as the two-thirds, and the short ones are about half as long as the body is wide (figs. d, e). The parapodium is bluntly conical and has one setal fascicle. Setae are compound and have a short, bidentate appendage with minutely serrated cutting margin (figs. f, g). A bayonet seta (fig. h) is first present in the superior part of the 25th parapodium. Each aciculum (fig. i) has a blunt tip; they number 3 in median parapodia. Pygidial cirri are slender and as long as the last twelve segments.

Autolytus usaensis resembles *A. alternata* IMAJIMA and HARTMAN (1964) in having a pair of long nuchal epaulettes and alternating dorsal cirri through



Text-fig. 20. *Autolytus (Regulatus) usaensis* n. sp. a, anterior end, in dorsal view, $\times 35$; b, a part of pharyngeal trepan opened by dissection, $\times 370$; c, two teeth of trepan, in lateral-inner view, $\times 800$; d, e, 24th and 25th parapodia, in anterior view, $\times 80$; f, compound seta from 1st parapodium, $\times 950$; g, compound seta from 25th parapodium, $\times 950$; h, bayonet seta, $\times 950$; i, aciculum, $\times 950$.

the body. However, the pharyngeal trepans of the two are very different.

Distribution: Southern Japan.

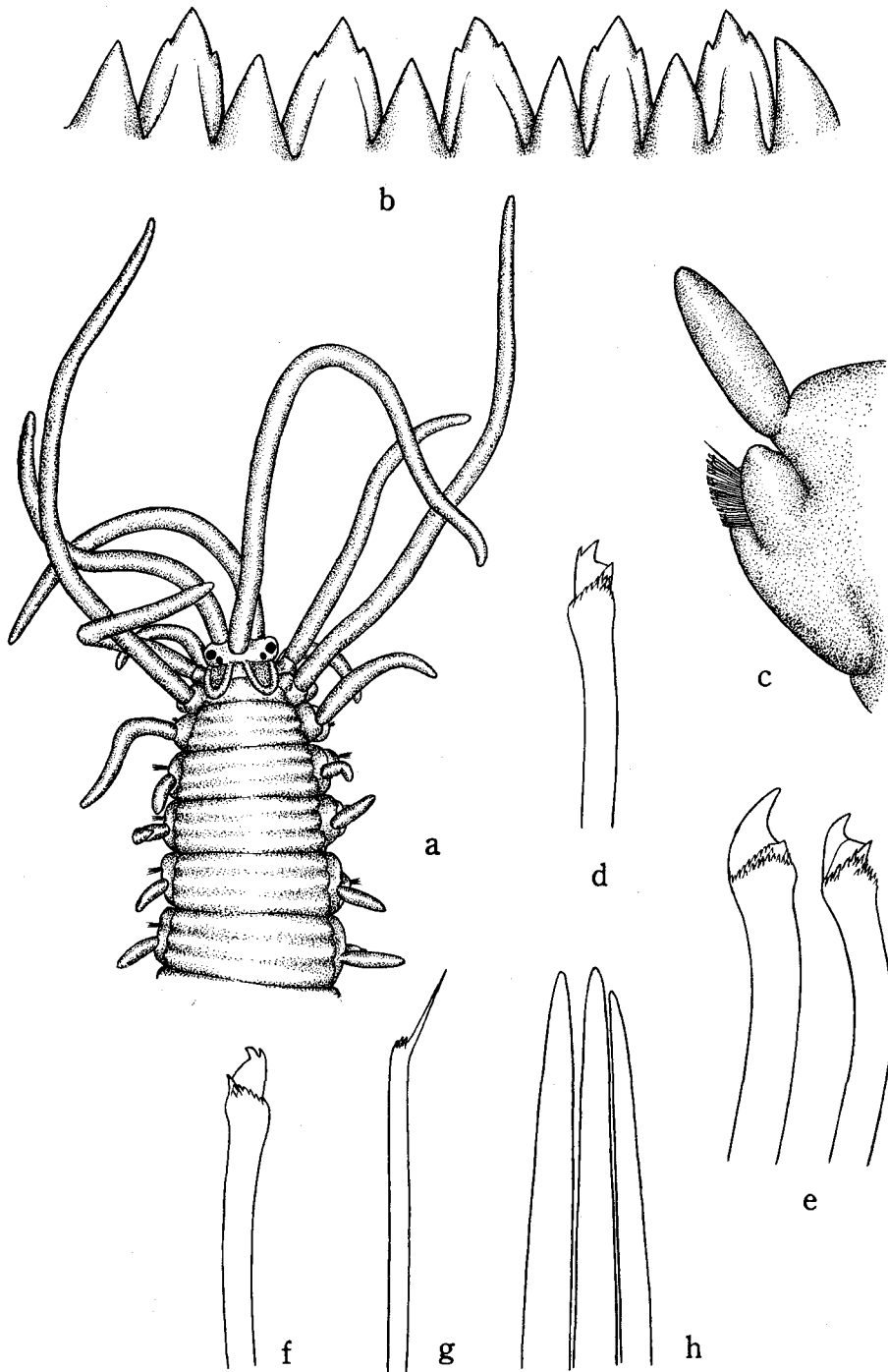
Autolytus (Regulatus) setoensis n. sp.

(Text-fig. 21, a-h)

Collection: Seto, in the intertidal zone.

Description: A complete specimen and an anterior fragment were collected. The first measures 13 mm long and about 1 mm wide including parapodia; it consists of 68 setigerous segments. The body is orange and lacks color markings. Segments have no ciliary bands. The prostomium (fig. a) is rectangular, wider than long; there are two pairs of reddish eyes in trapezoidal arrangement. A median antenna arises from the center of the prostomium and extends back to the 11th segment. Lateral antennae arise from the anterior margin of the prostomium; they are about two-thirds as long as the median one. Palpi are small and fused throughout their length. A pair of nuchal epaulettes extends from the posterior margin of the prostomium to the middle of the second segment; they are basally broadest. The pharynx is S-shaped and terminates in 9 soft papillae. The trepan (fig. b) has a circlet of 9 large and 9 small teeth in alternating arrangement; the large tooth has two minute serrations on either side, similar to those of *Autolytus usaensis*, but less developed than in *A. usaensis*, and the small teeth between the large teeth are proportionately larger than those of *A. usaensis*. The proventriculus is in setigerous segments 7 to 8. Dorsal tentacular cirri are as long as the lateral antennae and ventral cirri are about one-third the length of the dorsal one. The first dorsal cirri are as long as the median antenna. The second cirri are about one-fourth as long as the first cirri. More posterior dorsal cirri are equal, each half to one-third as long as the body is wide. Parapodia (fig. c) are bluntly conical; each has a fascicle of composite setae. The first few anterior parapodia have a fascicle consisting of four bidentate in superior (fig. d), and four unidentate setae in inferior position (fig. e). Thereafter, unidentate setae in inferior position are replaced by bidentate ones. Setae in median parapodia (fig. f) have a beak-like secondary tooth. A bayonet seta (fig. g) first appears from the 18th parapodium. Acicula (fig. h) number 3 in anterior parapodia and are reduced to single ones posteriorly.

Autolytus setoensis resembles *A. usaensis* in having a trepan with a circlet of 9 larger teeth accompanied with two small serrations on each side and 9 smaller teeth. The first differs from the second in the following respects: (1) the nuchal epaulettes of the first extend through two, instead of six segments; (2) each of the anterior few parapodia has a setal fascicle consist-



Text-fig. 21. *Autolytus (Regulatus) setoensis* n. sp. a, anterior end, in dorsal view, $\times 35$; b, a part of pharyngeal trepan opened by dissection, $\times 740$; c, median parapodium, in anterior view, $\times 120$; d, superior bidentate seta from 1st parapodium, $\times 950$; e, inferior unidentate setae from same parapodium, $\times 950$; f, bidentate seta from median parapodium, $\times 950$; g, bayonet seta, $\times 950$; h, acicula from 1st parapodium, $\times 950$.

ing of unidentate and bidentate compound, instead of only bidentate composite setae.

A. setoensis resembles *A. vulgarius* in having nuchal epaulettes extending through the second segment and unidentate composite setae are present in a few anterior parapodia. However, in *A. vulgarius* the first parapodium has unidentate composite setae only and the large tooth of the trepan is smooth, not accompanied by lateral serrations.

Distribution: Southern Japan.

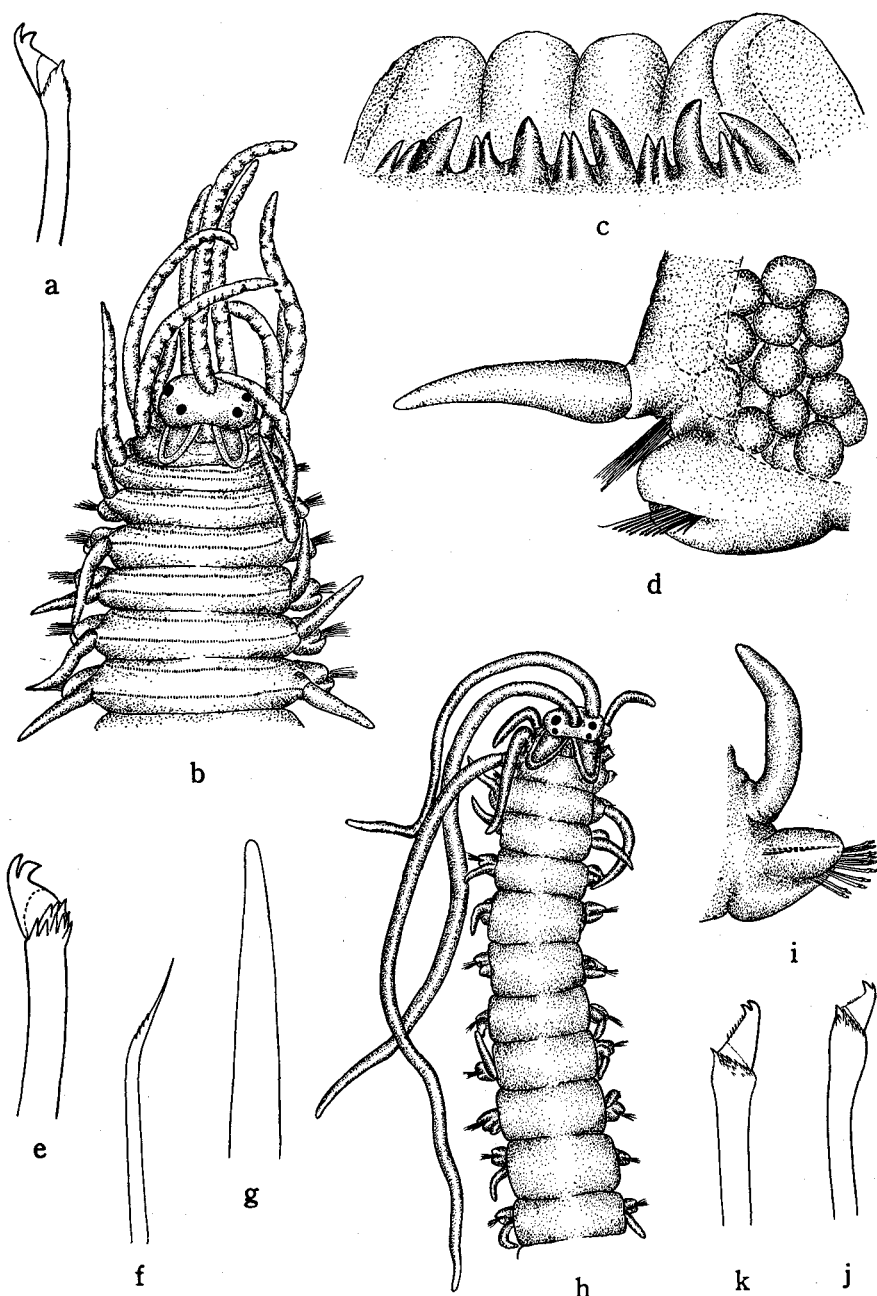
Autolytus (Regulatus) noroi IMAJIMA and HARTMAN, 1964

(Text-fig. 22, a)

Autolytus noroi IMAJIMA and HARTMAN, 1964, pp. 97-98, pl. 20, figs. a-g.

Collection: Off Cape Shiriyazaki, in 140 m; Shirikishinai, in 40 m; Asamushi; Onagawa; Seto; Tamano; Mukaishima; Usa; Noto-ogi, in the intertidal zone among seaweed colonies.

Description: The largest individual measures 13 mm long and 0.6 mm wide including parapodia, and consists of 87 setigerous segments. In life the dorsum has a yellow longitudinal band along the median line of the body; both outer sides are orange and the outermost sides including parapodia are blue. In alcohol-preserved specimens these pigments are destroyed; the body is then pale brown due to the presence of many pigmented ducts located beneath the epithelium. The prostomium is subglobular with the anterior margin slightly wider than the posterior one. Two pairs of eyes are orange colored with the anterior about twice as large as the posterior pair. The median antenna arises from the center of the prostomium and reaches back to the twelfth segment. The lateral antennae arise from the anterior margin of the lobe and are about half as long as the median one. Palpi are medially fused along their entire length. The dorsal tentacular cirrus of the first segment is about as long as the lateral antennae, and the ventral one is slightly shorter than half the length of the dorsal one. The antennae and tentacular cirri have numerous short cilia. A pair of nuchal epaulettes extends from the posterior margin of the prostomium through the hinder margin of the second segment, or through half or all of the third segment. The pharynx is S-shaped and distally surrounded by 9 large soft papillae. The trepan has 9 large and 18 small teeth in a series so that two small ones alternate with each of the large teeth. The proventriculus is ellipsoid and extends from segment 11 to 13 or 14. The first dorsal cirri are longer than the median antenna and reach back to segment 15. The second dorsal cirri are about one-third as long as the first cirri, and more posterior ones are about a half to a third that of the width of the body. In the posterior



Text-fig. 22. *Autolytus (Regulatus) noroi* IMAJIMA and HARTMAN. a, compound seta from 1st parapodium, $\times 840$;

Autolytus (Regulatus) nipponensis IMAJIMA and HARTMAN. b, anterior end, in dorsal view, $\times 38$; c, a part of pharyngeal trepan, $\times 600$; d, 17th parapodium, in anterior view, $\times 150$; e, compound seta, $\times 1000$; f, bayonet seta, $\times 1000$; g, aciculum, $\times 1000$.

Autolytus (Regulatus) nipponensis longicirratus n. subsp. h, anterior end, lateral antennae and tentacular cirri not shown, in dorsal view, $\times 25$; i, 12th parapodium, $\times 85$; j, transitional compound seta from 1st parapodium, $\times 840$; k, compound seta, $\times 840$.

region of the body the dorsal cirri alternate one long cirrus with two short ones. The long cirrus is two to three times as long as the short one. All dorsal cirri have many short cilia like those on the antennae and tentacular cirri. A ciliary band extends dorsally across each segment, between the bases of the dorsal cirri. A normal parapodium is bluntly conical and provided with a setal fascicle in which all setae are compound; distally they are bidentate and the secondary tooth is larger than the terminal one. Each seta of the first parapodium (fig. a) has a large terminal secondary tooth; these are similar to those of more posterior parapodia. A bayonet seta is first present from setigerous segments 13 to 16. A rodlike aciculum occurs singly in parapodia; it tapers distally to a pointed tip. The pygidium has two long anal cirri.

Distribution: Northern to southern Japan.

Autolytus (Regulatus) nipponensis IMAJIMA and HARTMAN, 1964

(Text-fig. 22, b-g)

Autolytus nipponensis IMAJIMA and HARTMAN, 1964, pp. 96-97, pl. 19, figs. a-f.

Occurrence: Shirikishinai, in shallow water from laminarian holdfasts.

Diagnosis: A single complete female specimen measures 9 mm long and 1 mm wide for 55 setigerous segments; its color is dark brown, without a pattern. The prostomium (fig. b) is broader than long; there are two pairs of eyes in trapezoidal arrangement. A median antenna arises between the anterior eyes and extends back to the seventh segment. Lateral antennae arise from the anterior margin of the prostomium and are slightly shorter than the median one. A pair of nuchal epaulettes extends from the posterior margin of the prostomium through the second segment. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan (fig. c) is provided with 9 large and 18 small teeth arranged in alternate series; the smaller are about half as wide as the larger ones. The proventriculus extends from the seventh to the tenth segment. The dorsum of each segment is crossed by two ciliary bands extending to the sides. Dorsal tentacular cirri are about as long as the lateral antennae; the ventral ones are slightly shorter than half the length of the dorsal ones. The first dorsal cirri are about as long as the paired antennae; the second ones are as long as the width of the second setigerous segment. Thereafter all dorsal cirri are subequal in length and shorter than half the width of their respective segments. Parapodia are bluntly conical and provided with setal fascicles emerging from between the two lobes. From the seventeenth parapodium a tuft of hairlike, swimming setae appears in the concave groove between the dorsal cirrus and the setigerous lobe (fig. d). These simple setae are short, not

extending beyond the tips of the normal setal fascicle.

The body cavity is crowded with ova; there is no egg mass forming a cluster on the ventral side of the body. Compound falcigers have a short appendage with a subdistal, beaklike secondary tooth larger than the terminal one (fig. e); the distal end of the shaft terminates in many sharp spines. A bayonet seta (fig. f) is first present in the superior part of the seventeenth parapodium. Acicula (fig. g) are generally double in a parapodium; they terminate in a blunt tip.

Distribution: Northern Japan.

Autolytus (Regulatus) nipponensis longicirratus n. subsp.

(Text-fig. 22, h-k)

Collection: Off Cape Shiriyazaki, in 150 m.

Description: An single individual measures 5.5 mm long and 0.8 mm wide. The body consists of 16 normal setigerous segments and 25 regenerated segments posteriorly; preserved, it is brown, without color pattern. The prostomium (fig. h) is broader than long; two pairs of eyes are reddish and in trapezoidal arrangement, the anterior pair is the larger. A median antenna arises from the center of the prostomium and reaches back to the fifteenth segment. The lateral antennae arise from the anterior margin of the prostomium and are about two-thirds as long as the median one. Palpi are medially fused along their entire length. A pair of nuchal epaulettes extends from the posterior margin of the prostomium through the middle of the second segment. The features of pharynx, trepan and proventriculus agree with those of the stem, *A. nipponensis*. Dorsal tentacular cirri on the first segment are about one-third as long as the lateral antennae. Ventral cirri are about half as long as the dorsal ones; they are smooth and much slenderer than those in the stem. The first dorsal cirri are much longer and are about as long as the median antenna. The second are about one-sixth as long as the first; their length is about as long as the body is wide. More posterior dorsal cirri are about half as long as the body is wide; all are subequal in length. A normal parapodium is bluntly conical and has a fascicle of compound setae. Those of the first parapodium have a subdistal, secondary tooth larger than the terminal one (fig. j). On more posterior parapodia the two distal teeth are subequal (fig. k) and the cutting margin has minute serrations. The inflated end of the shaft has small serrations. A bayonet seta is present only in posterior parapodia. The pygidium has two slender anal cirri.

The subspecies, *longicirratus*, differs from the stem, *Autolytus nipponensis*, as follows: (1) the dorsum of each segment lacks, instead of have two transverse ciliary bands; (2) nuchal epaulettes extend through the middle, instead

of through the posterior margin of the second segment; (3) antennae and the first dorsal cirri are longer than those of the stem: the median antenna reaches back to the 15th, instead of the 7th segment, lateral ones to the 10th, instead of 6th segment and the first dorsal cirri reach to the 15th, instead of 7th segment; (4) the distal teeth of composite setae are subequal, instead of having a beaklike secondary tooth larger than the distal one, and (5) the cutting margin of the appendage has minute serrations, instead of lacking them.

Distribution: Northern Japan.

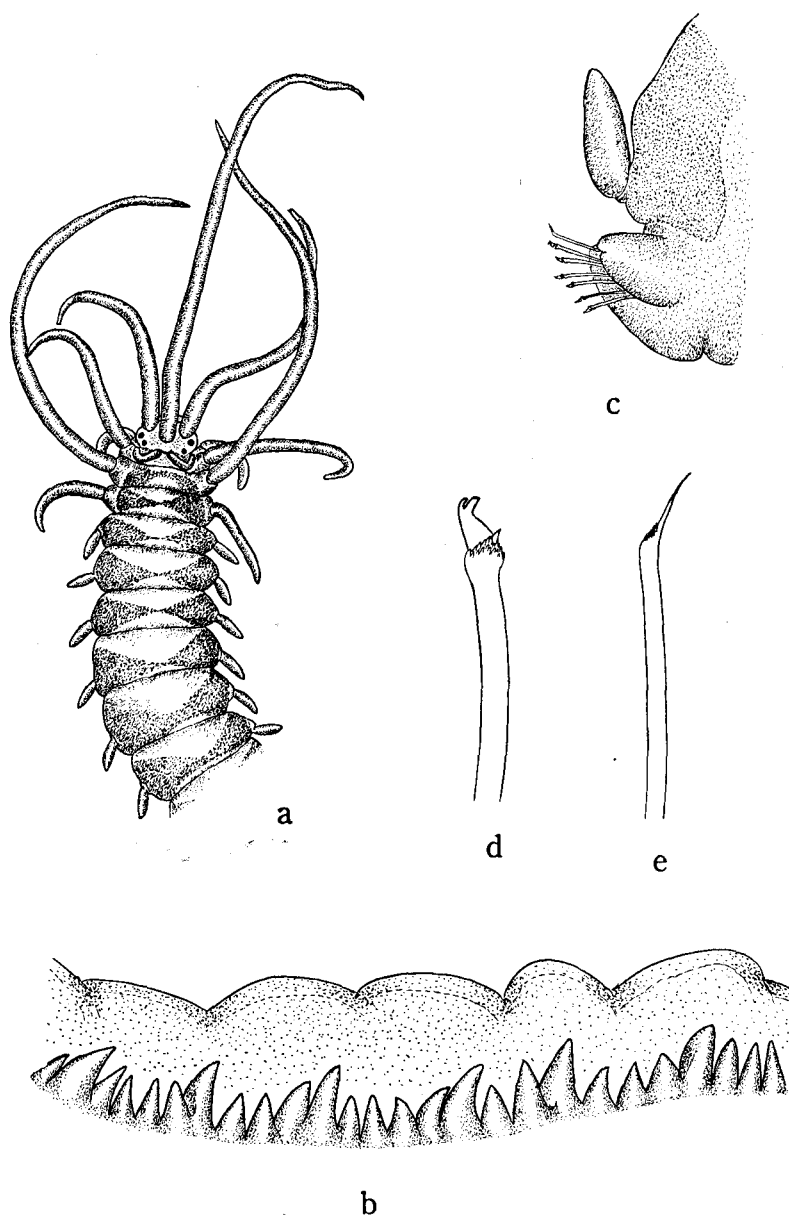
Autolytus (Regulatus) mukaishimus n. sp.

(Text-fig. 23, a-e)

Collection: Mukaishima, in the intertidal zone among seaweed on rocks and attached to *Sargassum*.

Description: A large individual measures 9 mm long and 0.6 mm wide; it consists of 49 setigerous segments. The dorsum of each segment except the tentacular one is pigmented by a medially narrowed, black color pattern, and the rest of the body is yellowish white (fig. a). The prostomium is broader than long. A median antenna arises between the anterior eyes; it extends back to the twelfth segment. The lateral antennae arise from the anterior margin and each is about two-thirds as long as the median one. A pair of nuchal epaulettes is present on the tentacular segment. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan (fig. b) has 34 to 44 teeth in a series arranged so that two to four teeth intercalate between each of the 9 large teeth. The proventriculus is short and occurs on the fourth and fifth setigerous segments. Dorsal tentacular cirri on the first segment are about two-thirds as long as the lateral antennae. The ventral tentacular cirri are about half as long as the dorsal ones. The first dorsal cirri are slightly shorter than the median antenna, and the second are about one-fourth as long as the first. The more posterior dorsal cirri are short, measure one-third to one-fourth as long as the body is wide; all cirri are subequal. A normal parapodium (fig. c) is bluntly conical and has a fascicle of compound setae. The first parapodium has 13 compound setae; they decrease to only 4 in posterior parapodia. Each seta (fig. d) has a secondary tooth larger than the terminal one; the cutting margin is smooth. A bayonet seta (fig. e) occurs from the first through all parapodia; it is located in the superiormost part of the fascicle. Acicula are pale yellow and number one to two in a parapodium; each one tapers to a pointed tip. The pygidium has two long anal cirri.

Autolytus mukaishimus resembles *A. brachycephalus* (MARENZELLER, 1874) from



Text-fig. 23. *Autolytus (Regulatus) mukaishimus* n. sp. a, anterior end, in dorsal view, $\times 35$; b, a part of pharyngeal trepan opened by dissection, $\times 950$; c, 15th parapodium, $\times 120$; d, compound seta of median parapodium, $\times 950$; e, bayonet seta, $\times 950$.

the Adriatic Sea, *A. longeferiens* SAINT-JOSEPH (1887) from France, and *A. rubrovittatus* CLAPARÈDE (1864) from Mediterranean Sea, in having a trepan with a series of small teeth between each large one. *A. longeferiens* is orange, anterior segments have three longitudinal red bands, and nuchal epaulettes extend through the 2nd segment. *A. rubrovittatus* has three reddish longitudinal bands on the dorsum; each segment has granulations forming a transverse band, and the trepan has 7 large teeth and 4 to 5 small teeth located between the large ones. *A. brachycephalus* lacks nuchal epaulettes.

Distribution: Southern Japan.

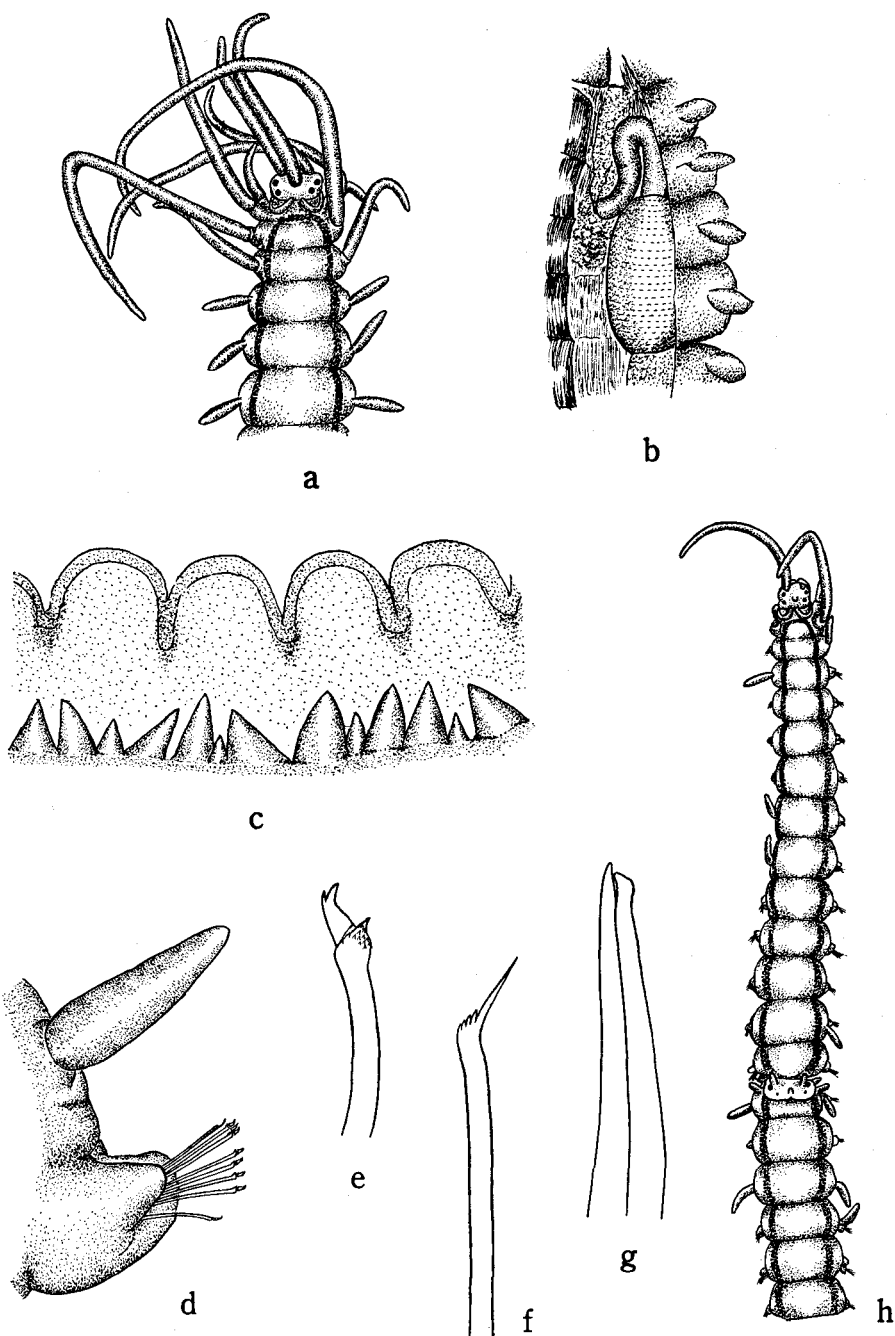
Autolytus (Regulatus) boreatus n. sp.

(Text-fig. 24, a-h)

Collection: Off Cape Shiriyazaki, in 140 m.

Description: The largest specimen measures 16 mm long and 0.8 mm wide including parapodia; it consists of 67 setigerous segments. The body is pale yellow and has two longitudinal black bands on the dorsum; each is widely separated on the middorsum (figs. a, h). The prostomium is broader than long and has two pairs of reddish eyes in trapezoidal arrangement. A median antenna arises from the center of the prostomium; its distal end is damaged. Lateral antennae arise from the anterior margin of the prostomium and extend back to the sixth segment. Nuchal epaulettes extend from the posterior margin of the prostomium to the middle or hinder margin of the tentacular segment; each is subtriangular. The pharynx is S-shaped (fig. b) and surrounded distally by 9 soft papillae. The trepan (fig. c) has a circlet of 18 large and 9 small teeth, alternating one median small and two large teeth to each of the 9 surrounding papillae. The proventriculus extends to setigerous segments 5 and 6 or 6 and 7. The tentacular segment is distinct on the dorsal side, and the dorsal tentacular cirri are as long as the lateral antennae. The ventral tentacular cirri are about one-third as long as the dorsal ones. The first dorsal cirri extend back to the ninth segment. The second cirri are about one-third as long as the first ones. The following dorsal cirri are subequal in length and half to one-third as long as the body is wide. A normal parapodium (fig. d) is bluntly conical and has a fascicle of compound setae with a large secondary tooth (fig. e); the cutting margin is smooth. A bayonet seta (fig. f) is first present from parapodia 11 to 25. Acicula (fig. g) number two in the 15th parapodium; one is distally pointed and the other is distally curved. All stock individuals produce single sexual stolons, with the head of the stolon forming between setigers 13 and 14 (fig. h). The head has two pairs of eyes and three short cirri.

The dorsum of the species has two longitudinal black bands resembling



Text-fig. 24. *Autolytus (Regulatus) boreatus* n. sp. a, anterior end, in dorsal view, $\times 30$; b, pharynx and proventriculus, in ventral view, $\times 55$; c, a part of pharyngeal trepan opened by dissection, $\times 780$; d, 15th parapodium, $\times 120$; e, compound seta, $\times 950$; f, bayonet seta, $\times 950$; g, acicula, $\times 950$; h, anterior end, showing a sexual stolon forming between setigers 13 and 14, in dorsal view, $\times 20$.

that of *Autolytus okadai*; however, the trepans of the two species differ.

Distribution: Northern Japan.

Autolytus (Regulatus) alternata IMAJIMA and HARTMAN, 1964

Autolytus alternata IMAJIMA and HARTMAN, 1964, pp. 89-90, pl. 16, figs. a-g.

Occurrence: Off Shirikishinai, in 140 m.

Diagnosis: The large specimen measures 7 mm long and 0.5 mm wide excluding parapodia; it consists of 59 setigerous segments. The body is pale yellow, without color markings. The prostomium is bluntly triangular; its antennae are not known. There are two pairs of reddish eyes; the anterior pair is slightly the larger. Palpi are fused medially throughout their length. Nuchal epaulettes extend through five segments. The pharynx is S-shaped and distally surrounded by 9 soft papillae. The trepan has 9 large and 18 small teeth, alternating one large and two small, in addition to 18 small, conical teeth located at the bases of the larger teeth. The proventriculus extends from the twelfth to the fourteenth segment. Dorsal cirri alternate long and short throughout the body. The dorsum of each segment has one ciliary band extending between the bases of the dorsal cirri. Parapodia are bluntly conical and have fascicles of bidentate compound setae with smooth cutting margin. A bayonet seta is first present from the 17th parapodium.

Distribution: Northern Japan.

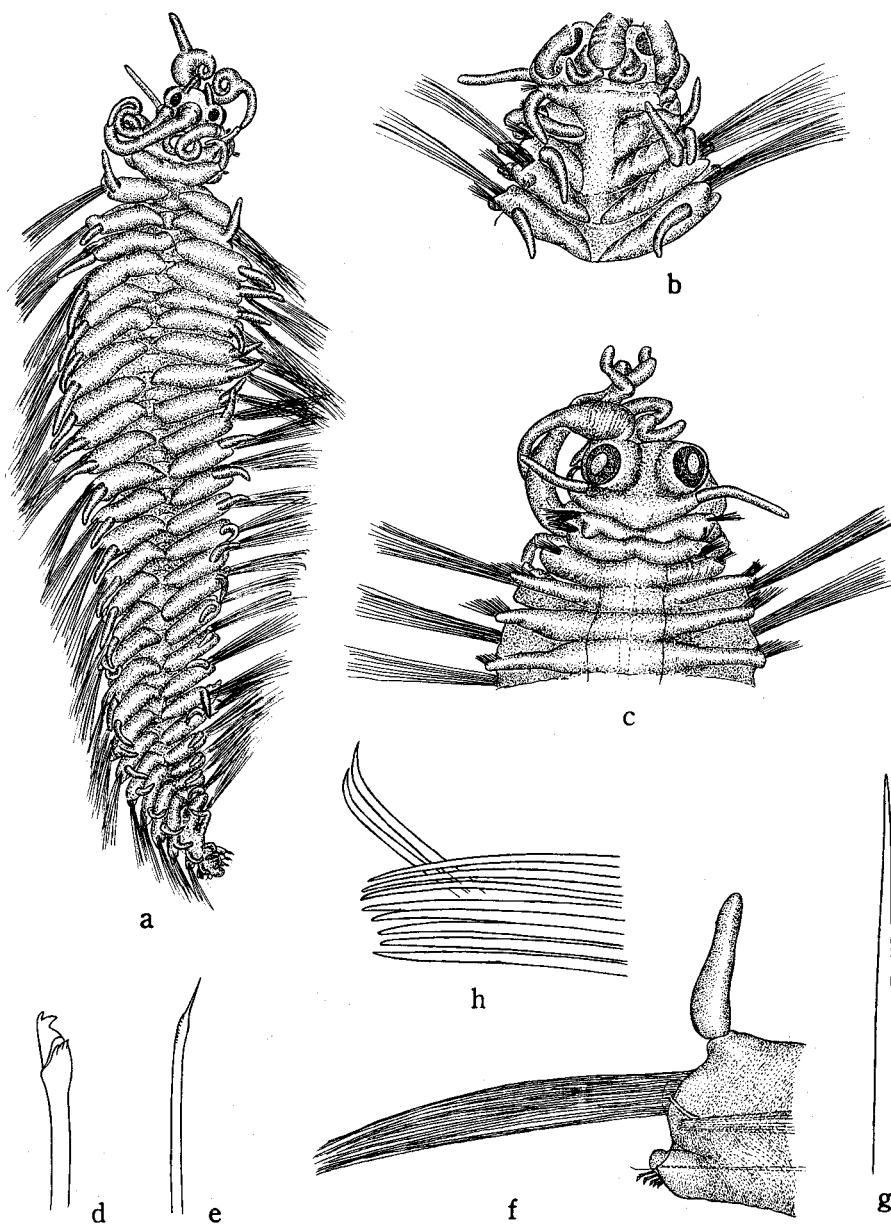
Autolytus species, epitokous individual

Polybostrichus stage

(Text-fig. 25, a-h)

Collection: Off Shirikishinai, in surface tows with plankton nets, in June.

Description: Three individuals in *Polybostrichus* stage were examined; they measure 3 to 4.3 mm long and 0.7 to 1 mm wide including parapodia. The body is yellowish white and has no color markings (preserved). The body (fig. a) consists of three regions: (1) prostomium, tentacular segment and 3 pre-epitokal segments, (2) 22 to 28 epitokal segments with swimming setae, and (3) 3 postepitokal segments. The prostomium is broader than long. There are two pairs of large reddish eyes; the ventral are about twice as large as the dorsal one. Two large antennae arise from the anterior margin of the prostomium and are bifurcated at their midlength. One pair of short frontal lobes arises in front of the anterior eyes. A median antenna is thick and extends back to the 9th setigerous segment. Palpi are lacking. The tentacular segment is dorsally fused; a pair of nuchal epaulettes (fig. b) partly encircles the posterior base of the median antenna; tentacular cirri



Text-fig. 25. *Autolytus* sp., *Polybostrichus* stage. a, entire body, in dorsal view, $\times 30$; b, anterior end, showing nuchal epaulettes and tentacular cirri, in dorsal view, $\times 50$; c, same, in ventral view, $\times 50$; d, compound seta, $\times 840$; e, bayonet seta, $\times 840$; f, 7th parapodium in epitokal region, in posterior view, $\times 85$; g, inferior aciculum in parapodium, $\times 170$; h, superior acicula in swimming setal bundle, $\times 170$.

number two pairs (figs. a, c). Dorsal tentacular cirri are thick and about as long as the median antenna. Ventral cirri are slender; each is as long as the prostomium is wide. The first three pre-epitokal segments (fig. b) are similar to one another and have fascicles of compound setae with a large secondary tooth (fig. d). A bayonet seta (fig. e) is first present from the first or second segment. Epitokal parapodia have very long, hairlike swimming setae emerging from between the bases of the dorsal cirri and the neuropodial lobes (fig. f). Acicula (fig. g) are generally singly in parapodia and each tapers distally to a pointed tip. Acicula of swimming setal bundles number eight straight, and two distally curved ones (fig. h).

A *Polybostrichus* stage having three pre-epitokal segments is known in *Autolytus prolifer* (O.F. MÜLLER) and *A. edwardi* SAINT-JOSEPH. The specific name of the present epitokous specimen cannot be determined because it lacks a pharyngeal armature.

This *Polybostrichus* is new to Japan.

Distribution: Northern Japan.

Myrianida MILNE EDWARDS, 1845

Type: *Myrianida pinnigera* (MONTAGU, 1808)

The body is slender. The prostomium has two pairs of eyes. Palpi are fused and turn ventrally. Three antennae, two pairs of tentacular cirri and all dorsal cirri are elongate foliaceous. The pharynx is sinuous and the trepan has a circlet of teeth; the proventriculus is ellipsoidal. Ventral cirri of parapodia are lacking. The pygidium has two anal cirri. Setae are compound and have distally bidentate appendages. Atokous stocks give rise asexually to male or female stolons, in chains. The sexual generation shows dissimilar males (*Polybostrichus*) and females (*Sacconereis*).

Myrianida pachycera (AUGENER, 1913), new combination

(Text-fig. 26, a-1)

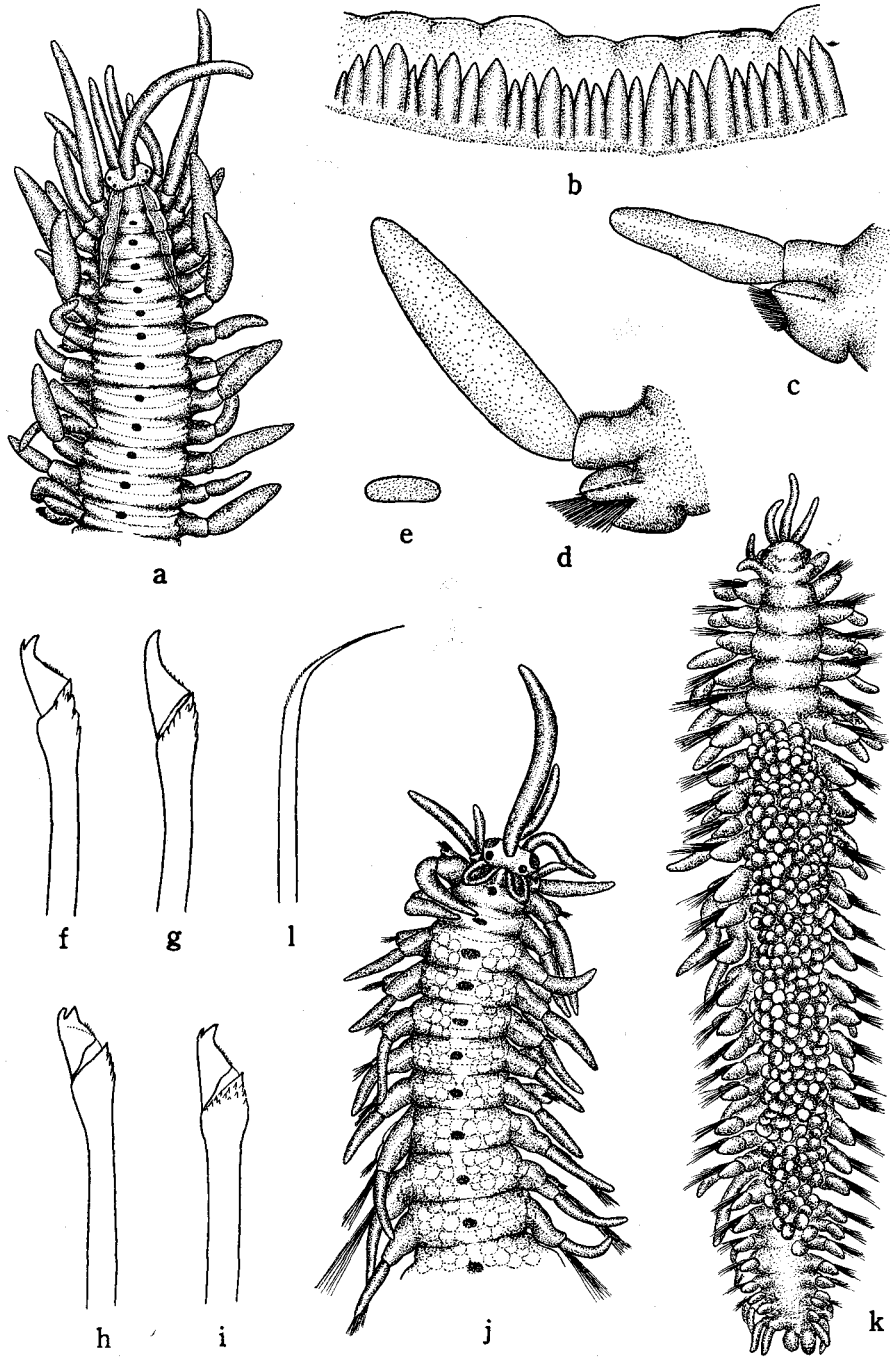
Autolytus pachycerus AUGENER, 1913, pp. 257-260, pl. 2, figs. 11, 12, text-fig. 40 a-c; MONRO, 1934, pp. 360-361.

Autolytus purpureimaculata OKADA, 1933, pp. 332-338, figs. 6-11; IMAJIMA and HARTMAN, 1964, p. 100.

Collection: Misaki; Seto; Usa; Amakusa; Noto-ogi, attached to a living oyster, *Ostrea gigas*, or among the ascidians, *Halocynthia*.

Atokous form

Description: The parent body consists of 30 setigerous segments and some stolons, in various stages, are arranged in a chain; the anterior region



measures 40 to 60 mm long and 1.3 to 1.6 mm wide. The dorsum (fig. a) is orange and has a deep purple spot in the blue. The median antenna and the first, fourth, sixth and following long dorsal cirri are deep blue, and lateral antennae and other short dorsal cirri are pale blue or white. The prostomium is broader than long and has two pairs of reddish eyes. The median antenna arises from the center of the prostomium and extends back to the 9th segment. Lateral antennae are about half as long as the median one. Each of the two pairs of nuchal epaulettes is a sinuous lappet; they arise from the hinder margin of the prostomium and extend back to the fifth or to the middle of the seventh segment. The original figure of the anterior body (AUGENER, p. 257, pl. 2, fig. 12) shows no such epaulettes, and they are not described; they may have been overlooked. The pharynx is S-shaped and terminates in 9 soft papillae. The trepan (fig. b) has 36 to 44 teeth arranged 1 to 5 small teeth between each of the 15 or 16 large teeth. The proventriculus extends to setigerous segment 8-10 or to 11-13. Each of the dorsal cirri has a long cirrophore and appendages alternate in length. The first dorsal cirri are as long as the median antenna and cylindrical. The following cirri are flat bladelike; the thickness is about one-third of the length (figs. c, d, e). The fourth, sixth, ninth and following alternating dorsal cirri are about as long as the body is wide. The dorsum of each segment is crossed by two ciliary bands; the posterior band extends to the cirrophore of the dorsal cirri. Anterior parapodia have fascicles of two kinds of composite setae: transitional bidentate setae (fig. f) with a rudiment terminal tooth occur in superior positions and unidentate setae (fig. g) in the inferior position; their cutting margins have minute serrations. Those of more posterior parapodia are replaced by bidentate and transitional bidentate setae (figs. h, i). The stock has no bayonet seta.

Through the courtesy of the Zoologisches Staatsinstitut und Zoologisches Museum a specimen of holotype of *Autolytus pachycerus* AUGENER (1913) from Sharks Bay was re-examined. The specimen has a pair of nuchal epaulettes extending through the fifth segment; other characters correspond completely with Japanese specimens.

Autolytus pachycerus is referred to *Myrianida* MILNE EDWARDS because most dorsal cirri are flat and bladelike.

Autolytus purpureimaculata OKADA (1933) from Misaki and Seto of Japan is

Text-fig. 26. *Myrianida pachycera* (AUGENER). a, anterior end, in dorsal view, $\times 18$; b, a part of pharyngeal trepan, $\times 320$; c, 3rd parapodium, in anterior view, $\times 50$; d, 4th parapodium, in same view, $\times 50$; e, cross section in median part of 4th dorsal cirrus, $\times 50$; f, transitional bidentate compound seta from 4th parapodium, $\times 840$; g, inferior unidentate compound seta from same parapodium, $\times 840$; h, i, compound setae from 28th parapodium, $\times 840$; j, anterior end showing pre-epitokal and a part of epitokal regions of *Sacconereis*, in dorsal view, $\times 30$; k, entire body of female stolon with eggs, in ventral view, $\times 30$; l, bayonet seta from same stolon, $\times 840$.

referred to *M. pachycera* (AUGENER) from Australia, with which it agrees in all characters.

Sacsonereis stage

An individual of *Sacsonereis* stage (fig. j) measures 6 mm long and about 1 mm wide. The body consists of three regions: 6 pre-epitokal, 18 epitokal with swimming setae and 7 postepitokal segments followed by the pygidium. A pair of nuchal epaulettes extends from the posterior margin of the prostomium to the middle of the second, instead of fifth segment as in the stock. The body cavity is crowded with ova.

A female stolon without swimming setae, from Amakusa in Kyushu, collected in October, (fig. k) has an egg mass attached to the ventral surface of the body, through segments 7 to 26. A bayonet seta (fig. l) is present in the first setal fascicle.

Distribution: Sharks Bay, Australia; Central to southern Japan.

Autosyllis IMAJIMA and HARTMAN, 1964

Type: *Autosyllis japonica* IMAJIMA and HARTMAN, 1964

Polybostrichus stage

The body consists of three regions: a pre-epitokal with 7, an epitokal with 13, and a postepitokal with 11 segments. The prostomium has three antennae and a pair of frontal lobes. The paired antennae arise from the anterior margin of the prostomium and are short, broad and fused at their bases. A long, median antenna is located on the posterior part of the prostomium; the frontal lobes are much shorter and slenderer than the median antenna. The prostomium has two pairs of eyes, one ventral, the other dorsal, and a pair of nuchal lobes located along its posterior margin. The first segment has two pairs of tentacular cirri, and the second (= first setigerous) segment has a short, clavate dorsal cirrus. More posterior segments have dorsal cirri alternating long and short. Dorsal cirri of median segments are foliaceous and flat. The setigerous lobe is conical; it has compound setae in which the appendage is distally weakly bifid. The pygidium has two short lobes.

Autosyllis japonica IMAJIMA and HARTMAN, 1964

Autosyllis japonica IMAJIMA and HARTMAN, 1964, pp. 104-105, pl. 22, figs. d-h.

Occurrence: Off Shirikishinai, in surface tows with plankton net, in October.

Diagnosis: A complete specimen of *Polybostrichus* measures 3.5 mm long and 0.8 mm wide. It consists of three regions; there are 6 pre-epitokal, 13 epitokal with swimming setae, and 11 postepitokal segments followed by the pygidium. Dorsal cirri in the pre-epitokal region alternate long and short; each is thick and clavate.

Distribution: Northern Japan.

(*To be continued.*)